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PROJECT COMPLETION REPORT

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

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East Asia and Pacific Regional Office

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KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Preface

This is a Project Completion Report (PCR) of the Sixth Railway Project for which Loan 1542-KO was approved in March 1978 in the sum of US\$120 million. The loan was fully disbursed and closed in December 1982, only six months after the originally planned date.

The PCR was prepared by the East Asia and Pacific Transportation Division I and is based on a review of the project files, information provided by the Korean National Railroads (KNR) and additional data gathered during the Project's final supervision in January-February 1983. The assistance of the Government and KNR in particular, is gratefully acknowledged.

In accordance with the revised procedures for project performance audit reporting, this PCR was read by the Operations Evaluation Department but the project was not audited by OED staff. The draft PCR was sent to the Borrower who approved it without modifications (see attachment).

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SIXTH RAILWAY PROJECTS (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Basic Data Sheet

<u>Key Project Data</u>		<u>Appraisal estimate</u>	<u>Actual</u>
Total project cost (W billion)		197.1	262.5
Overrun (%)			33
Loan amount (US\$ million)		120.0	120.0
Disbursed			120.0
Date physical components completed		12/31/81	12/31/82
Proportion completed by original date (%)			98
Proportion of time overrun (%)			2
Economic rate of return (%)		30	22
Financial performance			/a
Institutional performance			adequate

<u>Other Project Data</u>	<u>Original plan</u>	<u>Revisions</u>	<u>Actual</u>
First mention in files or timetable			10/75
Governments application			-
Negotiations			02/12/78
Board approval			03/30/78
Loan agreement			04/10/78
Effectiveness	07/30/78	08/03/78	08/03/78
Closing date	06/30/82	12/31/82	12/31/82
Borrower executing agency			KNR
Fiscal year of borrower			01/01-12/31
Follow-on project name			Railways VII

<u>Mission Data</u>	<u>Month/year</u>	<u>No. of weeks</u>	<u>No. of persons</u>	<u>Man-weeks</u>	<u>Date of reports</u>
Identification					
Preparation	04-05/76	1.0	2	2.0	05/21/76
Preappraisal	09-10/76	1.5	3	4.5	
Appraisal	04-05/77	3.5	3	10.5	
Post-appraisal	07/77	3.0	3	9.0	08/02/77
Subtotal		9.0		26.0	
Supervision I	04/78	2.0	3	6.0	06/12/78
Supervision II	11/78	2.0	2	4.0	12/22/78
Supervision III	05-06/79	1.0	4	4.0	07/31/79
Supervision IV	01-02/80	1.0	3	3.0	04/21/80
Supervision V	07/80	0.5	2	1.0	08/07/80
Supervision VI	07/81	0.5	3	1.5	06/05/81
Supervision VII	02/82	0.5	3	1.5	03/26/82
Completion	01-02/82	1.5	3	4.5	06/30/83
Subtotal		9.0		25.5	
Total		18.0		51.5	

<u>Country Exchange Rates (Won (W))</u>		<u>Average exchange rate</u>
<u>Year</u>		(US\$ 1 in W)
1977 (appraisal year)		484.0
1978		484.0
1979		484.0
1980		607.4
1981		681.0
1982		731.1
1983 year of completion report		n.a.

/a Financial objectives not reached due to slowdown in traffic demand growth as a result of the country's economic downturn.

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SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Highlights

The project was the sixth Bank Group operation in the railway sector in Korea. It consisted of a two year tranche of the Fourth Five Year Plan 1977-81, namely the plan investments scheduled to start in 1978 and 1979 (paras. 2.02 and 2.03).

The project achieved its objectives to increase KNR's capacity while improving operational efficiency and maintaining reasonable financial performance. As passenger traffic increased faster than freight, the investment plan was modified during implementation (para. 3.02). Modifications were in general suitable except for the complete doubling of the Chung Bug Line which was premature. After an exchange of views between the Government and the Bank, the Government agreed to compensate KNR for its expenditures on this line beyond the scope of the project (para. 3.03). Procurement for original project items was completed ahead of schedule, but some delay occurred in disbursement for additional items (para. 3.23). Project implementation was satisfactory except for the economic feasibility study of major investments for 1980 and 1981 financed under the technical assistance included in the project (para. 3.24).

During the project period, freight and passenger tariffs increased in real terms (para. 5.05). However, these increases were generally applied across the board, and some rates, particularly for ordinary passenger trains, still failed to cover costs (para. 5.07). As a result, KNR could not meet its financial objectives; and remedial actions were included in subsequent projects (paras. 5.16 to 5.18).

One aspect of this project's experience of more general interest is the very close cooperation and dialogue maintained with KNR on investment planning, traffic forecasting and financial/management policies and planning. A flexible approach on both sides permitted adjustments in the investment plan and in the project to best fit the needs of the rapidly evolving Korean economy.

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542)

PROJECT COMPLETION REPORT

1. INTRODUCTION

1.01 Korea's remarkable economic growth over the last two decades has been supported by an impressive development of its transport system. During 1961-78 transport demand grew faster than GNP. Domestic passenger traffic increased thirteen times and freight six times while per capita income more than tripled and real GNP multiplied five-fold.

1.02 To meet increasing demand for transport the Government embarked on a heavy transport investment program. About 20% to 25% of public capital expenditures were allocated to the transport sector during four successive 5-Year Economic Development Plans (1962-81). These considerable amounts were mainly used for increasing and modernizing the capacity of all transport means of the country.

1.03 The Bank has assisted Korea in reaching its transport objectives through the provision of finance for implementing capacity increase investments and technical advice aimed at optimizing use of available and additional resources. US\$434 million were financed by the Bank under seven Railway projects to help modernize and expand rail capacity and improve the Korean National Railroads (KNR) technical, managerial and financial performance. US\$147 million were financed under two ports projects to introduce containerization in Busan and improve the organization and management of ports. US\$465 million were financed under five road projects and a technical assistance credit to develop and maintain the national, provincial and county road system.

1.04 By the end of 1977 the Bank had helped finance the following railway projects:

Project	Year	Loan/Credit	Bank Loan/Credit amount (US\$ million)
First Railway Project	1962	Credit 25-K0	14.0
Second Railway Project	1967	Credit 110-K0	11.0
Third Railway Project	1970	Credit 183-K0	15.0
		Loan 669-K0	40.0
Fourth Railway Project	1972	Loan 863-K0	40.0
Fifth Railway Project	1974	Loan 1101-K0	100.0

Subsequent to the Sixth Railway Project the Government and the Bank agreed on a Seventh Railway Project estimated to cost US\$604.3 million of which US\$94 million would be financed from Loan 1836-KO.

1.05 Bank railway projects in Korea were aimed at improving KNR's organization and developing its assets. Until 1963, KNR was an integral part of the Ministry of Transportation; it had neither separate legal status nor independent management. In 1963, as required under the First Railway Project KNR was established as a semi-autonomous entity with its own manager, budget and accounting. The revised organization was an improvement, but there was still an excessive degree of dependence on, and control by, the Government in financial, budgeting and staff matters. At the Bank's request, the Government later agreed on measures giving slightly increased powers to KNR management, and enabling KNR to concentrate on installing and operating commercial budgeting and accounting systems. While the situation improved somewhat as a result of these steps, KNR's freedom of action continued to be hampered by the Government's strict control of budgets and tariffs. With pay scales tied to those of the Government's civil service, the railway has had difficulties in attracting and retaining certain specialized technical staff, notably accountants, economists and computer specialists.

1.06 Korea's railway system consists of 3,111 route-km of standard gauge (1.435 m) lines of which 607 km are double track and of 53 km of narrow-gauge (1.067 m) lines, linking major production and consumption areas and seaports (Map 13134). The narrow gauge Su-In line (Suwon-Incheon) will be widened to the standard gauge by end 1986 to handle anticipated imports of anthracite and bituminous coal through the Incheon Port Coal terminal presently under construction. The Bank will contribute to the financing of this terminal and the widening of the Su-In line as part of the Coal and Cement Distribution Project, the relevant loan of which was approved by the Board on April 26, 1983. Many lines pass through mountainous areas, requiring steep gradients and numerous sharp curves. Rails are mainly 50 kg/m, generally laid on wooden sleepers; concrete sleepers are being used as replacements on the higher speed lines. Operational performance is good and staff productivity high. Bank-financed railway projects have helped improve KNR's ability and efficiency to carry increasing quantities of freight, particularly coal and cement produced in the northeastern part of the country, and of rapidly growing passenger transport demand, largely in the Seoul area and the Seoul-Busan corridor.

1.07 The scope and content of the Sixth Railway Project are described in paras 2.03 and 2.04. The following Completion Report is based on information provided by KNR in compliance with Section 3.04 (c) of Loan Agreement 1542-KO, additional data gathered during the Project's final supervision in January-February 1983 and a review of the Bank's files in Washington.

2. PROJECT PREPARATION AND APPRAISAL

2.01 The possibility of a Sixth Railway Project was first mentioned in writing in late 1975, about the same time as the first draft of KNR's Investment Plan for 1977-1981 was prepared. The project was identified during a supervision mission in April 1976. The Investment Plan was further discussed during a preappraisal mission in September-October 1976 and the appraisal mission in April-May 1977, however basic agreement on the size of the plan was reached only during a post-appraisal mission in June-July 1977 and further minor reductions were undertaken during the continued preparation works.

2.02 The investment plan agreed to at negotiations totalled W 503 billion (US\$1037 million) with a foreign exchange component of W 211 billion (US\$436 million) or about 43%. Its breakdown is given below.

	<u>Local</u>	<u>Cost (W billion)</u>		<u>%</u>
		<u>Foreign</u>	<u>Total</u>	<u>of total</u>
New line construction	11.0	-	11.0	2.2
Electrification	4.7	4.0	8.7	1.7
Increase in station and line capacity	86.2	9.6	95.8	19.0
Way and structures	42.0	18.2	60.2	12.0
Motive power and rolling stock	46.2	133.0	179.2	35.7
Rolling stock repair facilities	15.7	8.9	24.6	4.9
Telecommunications, power facilities, buildings and others	17.7	1.6	19.3	3.8
Total Base Cost	<u>223.5</u>	<u>175.3</u>	<u>398.8</u>	<u>79.3</u>
Physical contingencies	<u>16.6</u>	<u>2.6</u>	<u>19.2</u>	<u>3.8</u>
Price contingencies	51.5	33.4	84.9	16.9
<u>Total</u> (US\$ million)	<u>291.6</u> <u>601.3</u>	<u>211.3</u> <u>435.7</u>	<u>502.9</u> <u>1037.0</u>	<u>100.0</u>

2.03 The project consisted of the plan investments starting in 1978 and 1979. The total project cost was W 197 billion (US\$406) million of which W 92 billion (US\$190 million) or about 47%, in foreign currency. A breakdown of the project cost is given in the following table:

	Local	Cost (W billion)		%
		Foreign	Total	of total
New line construction	2.3	-	2.3	1.2
Electrification	0.8	0.8	1.6	0.8
Increase in station and line capacity	29.5	3.5	33.0	16.7
Way and structures	20.9	7.2	28.1	14.3
Motive power and rolling stock	11.7	61.3	73.0	37.0
Rolling stock repair facilities	9.1	5.4	14.5	7.3
Telecommunications, power facilities, buildings and others	6.6	0.4	7.0	3.6
Total Base Cost	80.9	78.6	159.5	80.9
Physical contingencies	6.5	1.0	7.5	3.8
Price contingencies	17.2	12.4	30.1	15.3
	<u>Total</u>	<u>92.0</u>	<u>197.1</u>	<u>100.0</u>
	(US\$ million)	216.7	406.4	

2.04 The main components of the project were as follows:

1. Construction of a new siding for the Chang Weon industrial complex;
2. Electrification of the 8.5 km Seoul-Susaeg section;
3. Increase in line and station capacity, mainly:
 - (a) double tracking of (i) the 8.6 km Gongjeon-Bongyang section of the Chung Bug line, (ii) the 9.6 km Yongsan-Susaeg section of the Yong San line, and (iii) the 13.1 km Seongbug-Euijeongbu section of the Gyeong Weon line.
 - (b) construction of a by-pass line at Gyeongju, extension of marshalling yards (2 locations) and station yards (8 locations), extension of existing and construction of new crossing loops (20 locations), and construction of two new freight terminals in the Seoul area; and
 - (c) installation of CTC on about 200 km of lines;
4. Way and structures, mainly:

- (a) rail renewal (260 km), track renewal (70 km), acquisition and laying of concrete sleepers (150,000), addition of ballast (320,000 cu m);
- (b) separation of rail and road level at 59 crossings;
- (c) right-of-way improvements; and
- (d) construction and equipping of a permanent way workshop, and acquisition of track maintenance equipment;

5. Motive power and rolling stock, mainly:

- (a) acquisition of 30 diesel locomotives, 2 breakdown cranes, 211 passenger cars and 1420 freight cars; and
- (b) remodeling of 59 diesel locomotives, 14 railcars, 40 heating cars, 80 passenger and baggage cars, and improvement of 1000 freight cars;

6. Construction and equipping of a new passenger car workshop at Daejeon and improvement of existing workshops and sheds;

7. Additional telecommunication installations, power facilities, buildings and housing facilities; and

8. Provision of:

- (a) equipment for KNR's training facilities, and
- (b) technical assistance for feasibility studies, accounting, and mechanical equipment maintenance.

2.05 The items to be financed by the Bank under Loan 1542-KO were:

	Cost (including contingencies US\$ million)	%
Rails 50 kg/m (33,000 tons)	13.88	11.2
Track material workshop equipment	2.54	2.1
Track maintenance equipment	1.11	0.9
Breakdown cranes (2)	1.62	1.4
Special express passenger cars (45)	16.60	13.8
Linked express passenger cars (166)	32.87	27.4
Freight cars (1420)	46.08	38.4
Rolling stock workshop equipment	4.58	3.8
Training and technical assistance	0.72	0.6
<u>Total KNR</u>	<u>119.50</u>	<u>99.6</u>
Transport sector studies	0.50	0.4
<u>Total Loan</u>	<u>120.00</u>	<u>100.0</u>

2.06 A condition for loan effectiveness was the increase of KNR's freight and passenger tariffs to levels acceptable to the Bank. This was done on June 21, 1978. The loan became effective on August 3, 1978.

2.07 The particular covenants included in the Loan Agreement relate to (i) KNR's autonomy, (ii) a management study by consultants, (iii) KNR's financial objectives, (iv) feasibility studies prior to carrying out new investments, (v) a plan to improve the maintenance and utilization of KNR's locomotives and rolling stock, and (vi) transport sector studies. Details are shown in Annex 1.

3. PROJECT IMPLEMENTATION AND COST

Project Start-up

3.01 There were no particular start-up problems. For the major Bank-financed project items bids were invited within 5 weeks after signing of the Loan Agreement.

Revision of Content of Project

3.02 General. The content of the project was changed substantially (Tables 3.1 and 3.2), the main changes being:

- (a) the doubling of the whole Chung Bug line (113 km), of which only an 8.6 km section originally was included in the project (para. 3.03);
- (b) change in the alignment and scope of the Gyeongju by-pass line (para 3.04);
- (c) change in size and at the same time deferment of the Bugog freight terminal (para 3.05);
- (d) additional work on station buildings (para. 3.06);
- (e) additional quantities of Bank financed items (para. 3.07);
- (f) addition of new items (para. 3.08 and Table 3.2);
- (g) deferment of capacity increasing investments, (para. 3.09); and
- (h) slowing down the permanent way improvement program (para. 3.10).

3.03 Chung Bug Line. The question of doubling the Chung Bug line was raised by KNR and the Government before the appraisal of the Sixth Railway Project. However, the Bank did not agree with the Government on the economic justification for the whole work, and only doubling of the section Gongjeon-Bongyang (8.6 km) at an estimated cost of W 2.6 billion including contingencies) was included in the project. Nevertheless, the Government, giving the doubling of the whole Chung Bug line high priority for political and military reasons, decided to go ahead with the construction and works were started along the whole line in early 1979. After exchange of views with the Government and KNR, the Bank suggested in a letter of September 4, 1979 that these works should not be considered part of KNR's investment plan and be executed without placing an extra financial burden on KNR. In a letter of February 4, 1980, the Government agreed to compensate KNR for its expenditures for the works not included in the Sixth Railway Project. This solution was not fully satisfactory as KNR had to bear maintenance and operating costs of an uneconomic and underutilized investment. This situation is expected to be somewhat alleviated when KNR will utilize the Chung-Bug line for transporting to the cement plants in the Jecheon area coal imported through the new Incheon port coal terminal and the Su-In line to be widened under the Coal and Cement Distribution Project (Loan 2267-KO signed April 29, 1983). The works were completed in October 1980 at a total cost of W 67.6 billion.

3.04 Gyeongju By-Pass Line. At the time of appraisal only preliminary engineering was done and on the basis thereof a 3.5 km by-pass line at a cost of US\$1.1 million (including contingencies) was envisaged. During final engineering the project was changed to include a 5.9 km line and two additional station yards. The total cost is now estimated at W 8.0 billion.

The works which started in April 1979, are ongoing and expected to be completed only in 1984.

3.05 Bugog Freight Terminal. The project included a general cargo terminal at an estimated cost of W 2.2 billion including contingencies. In early 1979 KNR suggested a substantial increase in the size of the terminal. After further analysis and discussions with KNR the Bank in November 1979 recommended to defer finalizing the plans for the terminal until the results of a then ongoing coal-and cement distribution study were available. KNR accepted this recommendation and the plans were deferred. Agreement on the final design has later been reached with the Bank and a new complex, including separate terminals for coal, cement, containers and general cargo is included in the Coal and Cement Distribution Project. The terminal, which is estimated to cost about W 79.8 billion, is under construction and expected to be completed by 1986. The costs shown under the Sixth Railway Project (W 8.0 billion) are mainly for land acquisition and earthworks carried out in 1979-80.

3.06 Station Buildings. The project included minor works (total cost below W 0.2 billion) at 30 stations. During the project period works were carried out at only 15 stations, but at a cost of W\$2.5 million of which about US\$1.0 million to rebuild the Iri station, which was badly damaged in an explosion and fire accident, and about W 1.3 billion at five other stations to meet traffic demand.

3.07 Additional Quantities of Bank-Financed Items. Considering the savings in cost on Bank financed items (para. 3.29 and 3.30) and the urgent need for passenger cars and track maintenance equipment, the Bank agreed to finance additional quantities as follows:

- (a) in December 1978, 35 passenger cars at a cost of about US\$8.4 million;
- (b) in January 1980, spare parts for passenger cars at a cost of US\$0.7 million; and
- (c) in June and November 1980, track maintenance equipment at a cost of about US\$0.6 million.

In November 1981 the Bank agreed to KNR using the then remaining uncommitted funds, about US\$0.7 million for employing local consultants for conducting detailed engineering for the widening of the gauge of the Su-In line (para. 3.25).

3.08 New Items. As shown in Table 3.2, KNR in 1978-80 carried out items not included in the project at a cost of about Won 24.6 billion. The main items were:

- (a) Improvement of stations in the Seoul area for electric operation at a cost of W 9.0 billion. The works, which mainly consisted of

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- (a) Improvement of stations in the Seoul area for electric operation at a cost of W 9.0 billion. The works, which mainly consisted of

new platforms, stairs and modifications of buildings, were needed for the increasing urban passenger traffic;

- (b) thirty-seven electric railcars at a cost of W 10.9 billion, needed to meet the urban traffic demand, and agreed to by the Bank in September 1979; and
- (c) A new station in Jeonju, at a cost of W 3.0 billion, which was needed for the city development and financed by the Government.

3.09 Deferment of Capacity Increasing Investments. Due mainly to lower freight traffic than forecast (paras. 4.01 and 4.02) and scarcity of local funds, capacity increasing investments, at a total estimated cost of about W 29.6 billion were deferred to 1981 or later. The major deferred items were:

	Appraisal cost estimate (incl. contingencies) W billion
Electrification Seoul-Susaeg (8.6 km)	2.2
Double track Yongsan-Susaeg (9.6 km)	5.0
Double track Seongbug-Euijeonbu (13.1 km)	6.0
Marshalling yard extensions (2 places)	3.1
CTC installation (about 200 km)	10.3
Miscellaneous items	2.0
<u>Total</u>	<u>29.6</u>

3.10 Track Renewal Program. Mainly because of scarcity of local funds KNR decided to slow down its permanent way improvement program. The main project works deferred to 1980 and later were:

	Appraisal cost estimate (incl. contingencies) W billion
Track renewal (50 km)	2.9
Concrete sleepers (60,000)	1.2
Ballast (286,000 cu m)	1.5
Separation of rail and road at level crossings (36 places)	6.3
Right-of-way improvements	1.8
<u>Total</u>	<u>13.7</u>

Project Implementation Schedule

3.11 Except for (i) the items which are deferred to 1982 or later (paras. 3.09 and 3.10) and (ii) the new Daejeon passenger car workshop which, mainly due to delays in engineering but also to slow progress in construction works is delayed almost two years, the project as defined at appraisal, was completed by the original completion date, December 31, 1981 (Table 3.1). For two items, the Chang Weon siding and the Gyeongju by-pass line (para. 3.04), which were substantially increased in scope, some works were carried over to 1982 and later.

Procurement

3.12 General. The estimated and actual procurement schedules for Bank-financed items are shown in Table 3.3. The analysis of the time for the different procurement steps is given in Table 3.4, and the result (for original project items only) is summarized below.

	Time (days)					
	Appraisal estimate			Actual		
	Max	Min	Aver.	Max	Min	Aver.
Delay in preparation of bid documents (time from appraisal estimate of date for Bank agreement on tender documents to actual date)	-	-	-	278	32	71
Completion of bid documents (time from Bank's agreement on bid documents to bid invitation)	17	14	16	197	5	36
Bid submission (time from bid invitation to bid opening)	103	61	77	83	50	67
Bid evaluation (time from bid opening to submission of evaluation to the Bank)	16	15	15	140	33	117
Bank review of the bid evaluation (time from submission of evaluation to the Bank to Bank's agreement to award)	15	15	15	15	3	9
Award of contract (time from Bank's agreement to award to signing of contract)	17	16	17	17	1	6
Total bidding procedure (time from Bank's agreement on bid documents to award of contract)	<u>167</u>	<u>122</u>	<u>140</u>	<u>448</u>	<u>155</u>	<u>237</u>
Delivery (time from signing of contract to completion of delivery)	608	334	468	799	281	409
Total procurement (time from Bank's agreement on bid documents to completion of delivery)	<u>747</u>	<u>457</u>	<u>609</u>	<u>1,024</u>	<u>461</u>	<u>645</u>

3.13 Preparation of bid documents The appraisal assumption that the Bank's agreement to all bid documents except rolling stock workshop equipment which was scheduled later, would come in March 1978 was very optimistic, considering that the SAR was issued only on March 15 and the Loan presented to the Board on March 31. KNR submitted most of the draft specifications to the Bank during negotiations in February 1978 and the Bank commented on them on March 7, 1978. However, the revision of the documents and the Bank's final review and agreement took another 1-2 months. Nevertheless, bid invitations for all items, except rolling stock workshop equipment (see above) and permanent way workshop machinery, the procurement of which was deferred by more than one year to match the timing of the construction of the workshop, was done by mid-May, within five weeks after the signing of the Loan Agreement.

3.14 Bid evaluation. The appraisal procurement schedule provided for one month for the Borrower's bid evaluation. Considering the two-step procedures used in Korea (opening and evaluation first of the technical proposal and only thereafter of the priced bids) and the involvement of two agencies; KNR and the Central Office of Supply (OSROK), this time is adequate only for exceptionally simple cases. For most of the items the bid evaluation took about 4.5 months, of which about 3 months for the review of the technical proposals, which in the case of the passenger and freight cars and the rolling stock workshop equipment was delayed because of complaints from bidders.

3.15 Bank review of bids. The Bank's review of the Borrower's bid evaluation took only 3 to 15 days, which is the same or better than the appraisal estimate.

3.16 Award of contract. The time from the Bank's agreement to award of contract to the signing of contract was average only 6 days or much shorter than the appraisal estimate.

3.17 Total time for bidding. The actual time from the Bank's agreement on bid documents to the award of contract varied from about 5 to 14 months (average 8 months) as compared to the appraisal estimate of 4 to 5.5 months (average 4.7 months). The difference is mainly related to the bid evaluation (para. 3.14).

3.18 Delivery. The actual average delivery period was about 13.5 months, or about 2 months shorter than the appraisal estimate. For limited express passenger cars, a substantial delivery delay occurred (para. 3.22), increasing the delivery period for this item to near 27 months. For all other items, the actual average delivery time was only about 12 months, or about 3.5 months shorter than the appraisal estimate.

3.19 Total procurement time. The actual average total procurement time (from Bank's agreement on bid documents to completion of delivery) for all Bank-financed items originally included in the project was about 21.5 months as compared to the appraisal estimate of about 20 months. The delivery of

all these items was completed by early January 1981, as scheduled at appraisal and about 18 months before the original Closing Date. The additional items (para. 3.07) were delivered by September 1981, except for one item, the track measuring car (para. 3.23), which was delayed beyond the original Closing Date.

3.20 Passenger Cars. The procurement of passenger cars (total cost about US\$57.3 million) involved some problems and is, therefore, described in detail below. Bids for 45 special express and 166 limited express passenger cars were invited on May 16, 1978. Four bids were received and the technical proposals were opened on August 1, 1978. After review by KNR and OSROK one bid was rejected as non-responsive to the specifications. Two proposals (from Ssangyong Corporation, Korea and Tang Eng Iron Works, Taiwan) were accepted while the fourth bidder, Hyundai Heavy Industries, Korea, which at the time was (and still is) one of Korea's leading manufacturers of heavy equipment (ships, diesel engines, cars etc.), was not considered qualified because of "absence of manufacturing and supplying records of the offered products." After complaints by Hyundai and further investigations, the Bank, recognizing Hyundai's experience and capability as a manufacturer of heavy equipment, on September 22, 1978, recommended OSROK to judge Hyundai's capability "from the plant and machinery they possess and the experience they have in the manufacture of industrial equipment which includes similar operations" (to manufacturing railway rolling stock). After further review KNR, however, maintained its earlier position, whereafter the Bank, considering that this was a case where (i) the capability of a Korean manufacturer was judged by Korean authorities, and (ii) there was no reason for doubts about the integrity of the judgment, on October 16 agreed to the proposed disqualification of Hyundai. Accordingly, OSROK decided to reject Hyundai's bid and the remaining two price proposals were opened on November 2.

3.21 For special express cars (45) only one bid (by Ssangyong) was submitted and later accepted. For limited express power source cars (14) Ssangyong submitted the lowest evaluated bid, while for limited express coaches (152) Tang Eng was the lowest bidder as shown below:

Bidder	Price (US\$)	Delivery period (months)
Ssangyong, Korea	31,536,135	12
Tang Eng, Taiwan	22,860,952	18

KNR and OSROK, who apparently wanted a contract with Ssangyong, expressed at this stage doubts about Tang Eng's capability to carry out a possible contract, however, the Bank, after further investigations, stated that it

would have no objection on technical basis to giving Tang Eng the contract. KNR then strongly emphasized the need for delivery within one year from contract, and OSROK, therefore, on December 18, recommended as its main alternative to award contract to Tang Eng only for the quantities (80 cars) this firm could deliver within one year, while the contract for remaining cars (72) would be awarded to Ssangyong. However, in case this proposal could not be accepted by the Bank, OSROK alternatively proposed award to Tang Eng of contract for all 152 cars. On December 21 the Bank agreed to the alternative proposal, and contract with Tang Eng was signed the following day.

3.22 According to the contract with Tang Eng the delivery of 152 cars would be completed by June 1980, however, due to internal problems within the manufacturing firm, the delivery was completed only by end-January 1981. Although limited express passenger traffic in 1980 was 26% above the appraisal estimate, it was lower than the 1979 traffic. The pressure to place new cars in service had therefore abated and the delay did not cause any problems.

3.23 Track measuring car. The procurement of a track measuring car, the financing of which was agreed to by the Bank in June 1981 (para. 3.07), involved complications, which delayed the delivery and caused a deferment of the Closing Date (para. 3.31). Bids were invited on September 25, and the technical proposals of the two bids received were opened on December 2, 1980. At the time of the opening of the priced bids, in early March 1981 one of the competitors, an Austrian firm informed the Bank that the other competitor, (a Swiss firm) had offered a machine which was not new as required by the specifications. The result of further comprehensive investigations by OSROK was that the Swiss firm could not show that the machine offered was new. OSROK therefore decided to invite new bids, which were opened on August 7 (technical proposals) and September 3 (price quotations). On September 28 the Bank agreed to award a contract as proposed by OSROK. The contract was signed on October 2, 1981, for delivery within 12 months, however the machine was actually delivered only in December 1982.

Technical Assistance

3.24 The main part of the technical assistance included in the project was for economic feasibility studies of major investments planned by KNR for the years 1980 and 1981 and proposed for inclusion in the Seventh Railway Project. Three of five invited Korean firms submitted proposals in August 1978. A Korean consulting firm assisted by a U.S. firm was selected to carry out the study, which started on February 9, 1979. The draft final report, which was issued in August 1979, was not acceptable to the Bank, and the consultants were requested to do a substantial revision of the report. This revision took very long time and the final report, which was of mediocre quality, was issued only in July 1980, close to two months after the signing of the Loan Agreement for the Seventh Railway Project. Thus, the study was of rather limited value for the preparation of that project.

3.25 During the preparation of the Coal and Cement Distribution Project the feasibility of widening the narrow-gauge Su-In line was studied, and as a result a decision was taken to include the works in that project. The final engineering study, which was completed in February 1982, was partly financed from Loan 1542-KO (para. 3.07). The widening of Su-In line will be carried out as part of the Coal and Cement Distribution Project (Loan 2267-KO).

Project Cost

3.26 General. A comparison of the appraisal estimate of price escalation with the actual cost development in Korea during the period 1976-1982 is shown in the following table:

	End 1976	Mid 1977	Mid 1978	Mid 1979	Mid 1980	Mid 1981	Mid 1982
<u>Local Currency Items</u>							
Appraisal estimate	100	104.0	112.3	121.0	129.8	138.9	148.2
Actual/a	100	104.4	116.6	138.4	192.3	235.5	247.6
Index (appr. est. = 100)	100	100.4	103.8	114.4	148.1	169.5	167.1
<u>Foreign Currency Items</u>							
Appraisal estimates	100	104.0	111.8	119.3	126.8	134.4	142.4
Actual /a	100	104.4	116.6	138.4	192.3	235.5	247.6
Index (appr. est. = 100)	100	100.4	104.3	116.0	151.7	175.2	173.8

/a Based on wholesale price index in Korea (for mid-1982 estimated). This is a reasonable approximation also for foreign currency items considering that (i) a large portion of these items were procured in Korea, and (ii) for imported items (mainly from Japan, Taiwan and USA) the devaluation of Won must be taken into account.

3.27 The actual project cost as reported by KNR, compared with appraisal estimates are shown in Table 3.5 and summarized below.

	Cost (W billion)			Total cost index
	Local	Foreign	Total	
Appraisal estimate	105.1	92.0	197.1	100
Actual cost:				
Total project	156.9	81.0	237.9	121
Non-project items (para. 3.08)	24.5	0.1	24.6	12
Total expenditures	181.4	81.1	262.5	133

3.28 The cost overrun of 21% (or 33% if also non-project items are counted) is analysed in Table 3.6. The analysis shows that only about 70% of the original project quantities were executed while about 30% were deferred. On the other hand, additional quantities of project items corresponding to 33% of the original project were carried out (of which 24% for the doubling of the Chung Bug line, (para 3.03). Thus, the total project quantities executed were slightly higher than the appraisal estimate (3%). This indicates an average price increase of 17% above the appraisal estimate, which is in line with the actual overall inflation in Korea over the execution period (para. 3.26).

3.29 Bank-Financed Items. The actual utilization of the loan is summarized in the following table:

	Cost US\$ million		Index (appr. est = 100)
	Appr. estimate and contingen- cies	Actual	
<hr/>			
Original Items			
Rails, 50 kg/m (33,000 t)	13.88	12.99	94
Track maintenance workshop equipment	2.54	2.51	99
Track maintenance equipment	1.11	1.23	111
Breakdown cranes (2)	1.62	1.11	69
Special express passenger cars (45)	16.60	14.33	86
Limited express passenger cars (166)	32.87	28.76	87
Freight cars (1,420)	46.08	44.38	96
Rolling stock workshop equipment	4.58	3.45	75
Training and technical assistance	0.72	0.40	56
 <u>Total KNR</u>	 <u>119.50</u>	 <u>109.16</u>	 <u>91</u>
 Transport sector studies	 0.50	 0.42	 84
 <u>Total Loan</u>	 <u>120.00</u>	 <u>109.58</u>	 <u>91</u>
 Additional Items Agreed with the Bank			
Limited express passenger cars (35)	-	8.36	
Spare parts for passenger cars	-	0.74	
Track maintenance equipment	-	0.62	
Engineering study of the Su-In line	-	0.70	
 <u>Total Additional Items</u>	 <u>-</u>	 <u>10.42</u>	
 <u>Total Loan</u>	 <u>120.00</u>	 <u>120.00</u>	 <u>100</u>

3.30 As shown in para. 3.29 the actual cost of the original Bank-financed items was only 91% of the appraisal estimate, leaving an amount of about US\$10.4 million for additional quantities of passenger cars, track maintenance equipment and technical assistance (para. 3.07).

Disbursements

3.31 Disbursements under the loan are shown in the graph, Annex 2. As shown in paras. 3.12 -3.19 there were some delays in the procurement of the Bank financed items which lead to about nine months delay in the start of disbursements. However, by the beginning of 1980 the delay was reduced to about two months and the disbursement for all original items was completed ahead of schedule. The delay in procurement of an additional item (para. 3.23) caused the 21 months delay in completion of disbursements and the deferment of the Closing Date of the loan.

4. TRAFFIC AND OPERATIONS

Freight Traffic

4.01 Freight traffic statistics for the period 1967 to 1982 are given in Table 4.1 and graph, Annex 3, which illustrate the history of traffic forecasts for the KNR from the Bank's Second to Seventh Railway Projects. The fourth project appraisal is the only one which underestimated the growth of freight traffic, and only by a small margin by 1976. The third, fifth, sixth and seventh project appraisal grossly overestimated traffic growth. By 1981 the forecast done for the sixth project exceeded the actual traffic by as much as 29%. For the period 1976-1979, an annual growth of 8.3% was projected while the actual growth was only 4.4%. In 1980 and 1981 the situation was even worse with a slight decline (about 1%) in total freight traffic, due to the general decline in Korea's economy. The growth was lower than expected for all commodities, and in particular for coal. The planned target for coal production of 24 mt by 1981 was not reached. Actually production stagnated around 18 mt until 1981 when it exceeded 19 mt for the first time. The risk of not achieving the target had been recognized at the time of the appraisal (para. 2.20 of the SAR). Cement traffic was also lower because of the stagnation in construction. Domestic demand for cement in 1980 and 1981 amounted to only 56 and 53% of installed capacity versus 92% in 1978.

Passenger Traffic

4.02 Intercity Traffic. As shown in Table 4.2 and graph, Annex 4 both the fourth and the fifth project appraisals underestimated the growth of intercity passenger traffic. In both cases the forecast was about 10% below actual traffic by the end of the forecast period. For the sixth project,

actual traffic exceeded forecast up to 1980, (+11% in 1979 and +8% in 1980); however, in 1981, traffic dropped 4% from its 1980 level and as a result the actual traffic came very close to the forecast. For the seventh project, which assumed continuation of the very high growth reached between 1976 and 1978, forecasts turned out to be extremely overestimated due to the difficult economic situation since 1979.

4.03 Seoul Urban Traffic. KNR's Seoul urban railway traffic (Table 4.3 and graph, Annex 5), which started in 1974 grew at an annual rate of about 22% from 1976 to 1981 as compared with a forecast of 13% in the sixth project appraisal. By 1981 the forecast was only 69% of the actual traffic. The forecast for the seventh project, which assumed a continuation of the steep growth up to 1979 also turned out to be too optimistic. As for other traffic, the economic decline in 1980-81 also affected the Seoul urban railway traffic, which from 1979 to 1982 grew only by about 6.5% annually as compared with the forecast growth of about 25%. The high growth forecast had been postulated in parts on the opening of new lines which was postponed due to the economic situation.

Operations

4.04 Selected operating statistics for 1977-82 are given in Table 4.4. In general, operational efficiency is very high. Availability of motive power and rolling stock increased over the period while utilization of rolling stock and productivity in general increased up to 1979-80, but declined thereafter due to declining traffic.

4.05 A comparison of forecast and actual operational performance indicators is shown in Table 4.5. For availability and average freight car load, the forecasts were achieved or exceeded. The utilization of limited express passenger cars was much better than forecast up to 1979 but declined with declining traffic in 1980-81. For the utilization of locomotives and special express passenger cars the appraisal forecast turned out to be too high. Turnaround for gondola cars has improved to a level close to forecast in 1981, while for other types of freight cars turnaround has declined to levels far below forecast, mainly due to declining traffic.

5. FINANCIAL PERFORMANCE OF THE BORROWER

BACKGROUND AND CONCLUSIONS

5.01 KNR's financial objective is to generate from its gross operating revenues funds sufficient to cover working costs, debt service requirements and finance a reasonable proportion of its capital expenditure without undue financial assistance from the Government. To this effect it was agreed during loan negotiations that the Borrower and KNR would take all measures necessary to allow KNR to earn gross operating revenues sufficient to cover the aggregate of (a) working costs; (b) depreciation provisions based on fixed assets revalued annually; and (c) rates of return on average fixed assets in use of not less than 2% in 1979, 3.2% in 1980 and 4% thereafter (Loan Agreement Section 4.04). KNR's actual gross operating revenue during project implementation (1977-82) covered each year items (a) and (b) but was not enough to earn the anticipated rate of return. The present analysis: (a) looks into reasons for KNR's failure to meet its rate of return targets; (b) assesses the impact of this failure on KNR's financial situation and (c) reports on remedial action taken in subsequent projects.

5.02 The analysis is backed by Tables 5.1-5.3 which show appraisal projections and actuals of KNR's income statements, sources and applications of funds and balance sheets for 1977-82 and Tables 5.4(a) to (e) which show actual total and unit operating revenues, operating costs and net operating revenues broken down into types of passenger trains and main freight commodities over 1977-81. Tables 5.1-5.3 are summarized in the Table on page 20.

5.03 The main conclusions to be drawn from the analysis are (a) that the very low tariff applied to ordinary passenger trains was the major reason behind KNR's failure to meet the project's financial objectives, and (b) that KNR would have been close to meeting its 1981 rate of return objective despite this inadequate rating, if the growth of the very profitable express train traffic, all of which exceeded appraisal forecasts (para. 5.04) had not significantly slowed down since late 1979 as a result of the difficult economic situation affecting Korea as well as the rest of the world (para. 5.06-5.09). The latter finding is a substantial and encouraging departure from the past when KNR's failure to meet its financial objectives was only due to the inadequacy of its tariffs.

Income Statements

Traffic

5.04 Actual passenger traffic exceeded appraisal forecasts by 16% in 1979. However, this excess decreased to 10% in 1980 and 8% in 1981 as overall passenger traffic stagnated at its 1979 level. KNR's freight traffic performance reached 96% of appraisal forecast in 1978, but only 83% in 1980 and 77% in 1981. The actual share of freight traffic decreased from 38% of total

KOREA

SIXTH RAILWAY PROJECTS (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Summarized Financial Statements, 1977-82
(Won billion)

	1977		1978		1979		1980		1981		1982	
	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal/b	Close estimate
Traffic												
Passenger (pass-km million)	16,562	17,099	17,873	20,054	18,603	21,553	19,265	21,640	19,903	21,551	31,662	21,034
Freight (ton-km million)	10,576	10,509	11,437	10,926	12,356	11,081	13,078	10,798	13,956	10,815	12,356	10,890
Total (traffic-units million)	27,088	27,608	29,310	30,980	30,959	32,634	32,343	32,438	33,859	32,366	44,018	31,924
Income Statement												
Gross operating revenue /a	135.1	128.0	146.1	145.6	158.3	159.6	170.8	162.5	181.8	171.5	296.7	231.8
Tariff increases	-	6.3	12.7	20.5	38.2	48.8	64.9	118.1	91.4	185.4	209.5	172.8
Total	135.1	134.3	158.8	166.1	196.6	208.4	235.7	280.0	273.2	356.9	506.2	404.6
Working costs	118.0	119.3	134.9	142.8	150.8	182.5	164.7	253.2	180.7	318.5	387.0	357.5
Depreciation	17.4	17.3	20.9	20.5	23.8	26.2	28.2	28.7	33.1	43.6	34.6	46.2
Net Operating Revenue	(0.3)	(2.3)	3.0	2.8	22.0	(0.2)	42.8	(1.1)	59.4	(5.2)	84.6	0.9
Net nonoperating revenue (Loss)	0.5	(1.4)	1.0	(1.3)	1.3	5.0	1.5	4.2	1.8	2.4	(2.4)	5.0
Interest charges	20.3	16.3	22.0	23.8	28.5	29.7	33.5	48.6	37.7	60.1	64.6	80.6
Net Profit (Loss)	(20.1)	(20.0)	(18.0)	(23.3)	(5.2)	(24.9)	10.4	(45.5)	23.5	(62.9)	17.6	(39.9)
Government subsidies against operating losses	21.7	21.7	14.6	21.4	12.0	31.0	7.5	5.0	-	-	-	34.8
Net income (loss)	1.6	1.7	(3.4)	(0.9)	6.8	7.0	18.3	(40.5)	23.5	(62.9)	17.6	(39.9)
Ratios												
Working (%)	87	89	83	86	77	88	70	90	66	89	76	88
Operating (%)	100	101	98	98	89	100	82	100	78	101	83	100
Rate of return on average fixed assets in use	-	-	0.3	0.3	2.1	-	3.5	-	4.2	-	5.5	-
Sources and Applications of Funds												
Sources												
Cash generated by KRR	18.3	16.6	25.7	28.4	48.0	34.3	73.4	41.4	95.3	54.4	130.8	57.1
Subsidies and contributions	21.7	22.5	17.6	22.0	16.5	89.6	17.2	27.2	3.1	22.9	48.8	52.8
Borrowing	64.1	49.0	79.7	57.4	95.9	87.4	87.6	116.5	72.8	121.6	189.9	178.0
Total Sources	104.1	88.1	123.0	107.8	160.4	191.3	172.2	185.1	171.2	198.9	369.5	287.9
Applications												
Investments	76.5	65.4	86.6	64.1	115.8	134.6	114.9	158.3	109.1	137.6	248.4	176.1
Debt services	36.2	34.0	36.4	40.4	44.1	48.2	52.9	85.0	60.3	95.6	106.2	121.5
Total Applications	112.7	99.4	123.0	104.5	159.9	182.8	167.8	243.3	169.4	233.2	354.6	297.6
Annual variations in working capital (8.6)	(11.3)	-	3.3	0.5	8.5	4.4	(58.2)	1.8	(34.3)	14.9	(9.7)	
Ratios												
Debt service coverage	0.5	0.5	0.7	0.7	1.1	0.7	1.4	0.5	1.6	0.6	1.3	0.5
Balance Sheet												
Assets												
Working capital	8.9	(3.7)	8.9	3.2	9.4	11.7	13.8	(46.5)	15.6	(80.9)	29.3	(90.6)
Net fixed assets	842.0	846.6	982.7	916.7	1,160.2	1,270.2	1,341.5	1,465.9	1,528.2	1,861.1	1,672.7	2,105.4
Other assets	7.4	36.2	7.4	54.5	7.4	43.5	7.4	136.2	7.4	70.1	55.4	70.1
Total Assets	858.3	879.1	999.0	974.4	1,177.0	1,325.4	1,362.7	1,555.6	1,551.2	1,850.3	1,757.4	2,084.9
Liabilities												
Long-term debt	278.3	289.3	343.6	357.6	423.9	425.1	486.1	602.1	536.3	704.3	851.0	844.4
Equity equivalent	580.0	589.8	655.4	616.8	753.0	900.3	876.6	953.5	1,014.9	1,146.0	906.4	1,240.5
Total Liabilities	858.3	879.1	999.0	974.4	1,177.0	1,325.0	1,362.7	1,555.6	1,551.2	1,850.3	1,757.4	2,084.9
Ratios												
Current	1.4	0.9	1.4	1.1	1.3	1.2	1.5	0.5	1.5	0.4	1.3	0.4
Debt to equity	32/68	33/67	35/65	37/63	36/64	32/68	36/64	39/61	35/65	38/62	48/52	41/59

/a In December 31, 1976 tariffs.

/b Seventh Railway Project.

traffic quoted in traffic units (1 pass-km equivalent to 1 ton-km) in 1977 to 33% in 1981, while the share of passenger traffic rose from 62% to 67%. Appraisal projections were 39% for freight and 61% for passenger in 1977 and 41% for freight and 59% for passenger in 1981. This shift in traffic trend adversely affected KNR's earnings as passenger traffic historically generated a profit while freight traffic, principally coal and cement, suffered heavy losses due to inadequate tariffs.

Tariffs

5.05 Table 5.1 shows that KNR's actual gross operating revenues were substantially higher than projected at appraisal mainly because traffic and tariff increases were higher than anticipated. The following table shows that, over 1977-81, passenger tariff increases slightly exceeded inflation every year except in 1980, and that by December 1981 they had been increased 6% more than the CPI over the 4-1/2 year project period. Freight tariff increases were below inflation through mid 1980 but exceeded it substantially for the rest of the period. As a result freight tariffs were increased about 10% more than inflation over the same 4-1/2 years. Coal tariffs which were historically lower than others were increased by 90% between mid-1980 and the end of 1981.

	CPI	Tariff indices		
		Dates of increases	Passenger	Freight
Mid-1977	100	Jan 1977	100	100
Mid-1978	115	Jun 1978	119	115
Mid-1979	135	May 1979	137	127
Mid-1980	175	Jan 1980	164	152
Mid-1981	215	Jun 1981	224	232
Dec 1981	222	Dec 1981	235	259

However, these increases were generally applied across the board. As a result some rates were still far short from covering costs. The most striking case relates to ordinary passenger trains, tariffs of which were even short of covering variable costs (Tables 5.4(a) to (e)).

Net Operating Revenue Generated by Passenger Traffic

5.06 The table in para 5.05 shows that until 1979 passenger tariffs grew faster than inflation. As a result the net operating revenue generated by this traffic increased from W 3.6 billion in 1977 to W 18.1 billion in 1979. During this period the rapid growth of the very profitable express trains'

traffic generated enough profits to more than offset losses on ordinary trains, for which tariffs did not even cover variable costs (Table 5.4 (a) to (e)). However, express train traffic growth slowed down in 1980-81 in line with the difficult economic situation of the country. As a result the net operating profit from passengers decreased rapidly to W 16.1 billion in 1980 and W 2.2 billion in 1981. The table in page 23 shows that these revenues would have been Won 18.5 billion higher in 1980 and W 60.5 billion in 1981 if express train traffic had continued growing at the same rate as between 1976 and 1979 (about 17% p.a.). The main explanation behind these potential additional profits is that the additional traffic would have been transported at variable operating cost only, as passenger fixed costs were covered by actual traffic (tables 5.4(d) and (e)).

5.07 The Government has systematically kept ordinary train tariffs low based on the understanding that they are mainly used by the poorest layer of the country's population. As this was a major reason behind KNR's failure to meet its financial objectives, the Government agreed to conduct a survey of ridership on ordinary trains in order to determine the occupancy factor and the optional fare to be applied to these trains' users, based on their income. Upon completion of the survey the Government, KNR and the Bank will agree on (a) possible reductions in the number of ordinary trains in operation; (b) tariffs; and (c) subsidies to be provided by the Government to make up for losses on ordinary trains and commuter traffic. A 50% increase in ordinary train tariffs applied in 1980 (considered to be a reasonable assumption) would have generated additional revenues of W 12.9 billion in 1980 and W 3.3 billion in 1981.

Net Operating Losses generated by Freight Traffic

5.08 Freight tariffs in general, in particular for coal and cement, which represent together about 60% of KNR's freight traffic, were historically much below costs. The table in para. 5.05 shows that freight tariffs were increased more than inflation over the project implementation period. This explains why net operating losses incurred from freight traffic which increased from W 1.4 billion in 1977 to W 19.9 billion in 1980, were reduced to Won 11.2 billion in 1981. Given KNR's high productivity there was little room for reducing operating costs. Even larger tariff increases would consequently have been needed to offset losses. However, their implementation would have been politically difficult in a period of very high inflation, and in some cases would even have adversely affected KNR's competitiveness.

	Traffic in pass-km mln			Gross operating	Variable operating	Additional net	
	Estimate	Actual	Difference	revenues	cost	operating revenues	
	<u>/a</u>			Won/pass-km	Won/pass-km	Won/pass-km	Total (Won bln)
<u>1980</u>							
Special Express	975	797	178	22.70	7.95	14.75	2.6
Limited Express							
Air conditioned	1,560	727	833	15.05	5.23	9.82	8.2
Non-air conditioned	9,000	7,739	1,261	9.40	3.31	6.09	7.7
<u>Total</u>	<u>11,535</u>	<u>9,263</u>	<u>2,272</u>				<u>18.5</u>
<u>1981</u>							
Special Express	1,120	722	398	29.30	11.52		5.6
Limited Express							
Air conditioned	2,500	2,040	460	16.14	5.93		12.1
Non-air conditioned	9,900	6,793	3,107	11.09	4.79		42.8
<u>Total</u>	<u>13,520</u>	<u>9,555</u>	<u>3,965</u>				<u>60.5</u>

/a Assuming a 17% p.a. traffic growth.

Overall Net Revenue and Net Profit (loss)

5.09 The following table shows (a) a breakdown of KNR's total net operating revenue; (b) net non-operating revenue; (c) total net revenues; (d) interest charges; and (e) net profit (loss) over 1977-81. Details are in Tables 5.1 and 5.4 (a) to (e).

	<u>Net Operating Revenue (loss)</u>					Net non- operating revenue (loss)	Interest charges	Net profit (loss)
	<u>Passengers</u>		Freight	Sun- dries	Total			
	Total	Ordinary Trains						
1977	3.6	(12.5)	(5.4)	(0.5)	(2.3)	(1.4)	16.3	(20.0)
1978	12.3	(18.3)	(8.0)	(1.5)	2.8	(1.3)	23.8	(22.3)
1979	18.1	(25.4)	(17.5)	(0.8)	(0.2)	5.0	29.7	(24.9)
1980	16.1	(33.7)	(19.9)	2.7	(1.1)	4.2	48.6	(45.5)
1981	2.2	(47.9)	(11.2)	3.8	(5.2)	2.4	60.1	(62.9)

Thanks to the above mentioned tariff increases, KNR was close to covering operating costs every year although the latter exceeded appraisal estimates by 5% in 1978, 19% in 1979, 46% in 1980 and 69% in 1981. However, it did not generate revenues enough to finance interest charge on loans contracted for financing project investments. Its annual net deficit grew in line with interest charges.

5.10 The following table gives net operating revenues (losses), rates of return and net revenues (losses) assuming that KNR would have been able to earn in 1980 and 1981 the additional revenues it could have generated from (a) increased ordinary train tariffs (para. 5.07); (b) continued growth in express trains traffic (para. 5.06) and (c) simultaneous materialization of assumptions (a) and (b).

Options	(a)		(b)		(c)	
	1980	1981	1980	1981	1980	1981
Net operating revenue (loss) W billion	11.8	8.1	17.4	55.3	30.3	68.6
Rate of return: %	1	0.5	1.4	3.6	2.4	4.5
Net revenue (loss) W billion	(32.6)	(29.6)	(27.0)	(2.4)	(14.1)	10.9

Loan Agreement rate of return objectives were 3.2% for 1980 and 4% for 1981. KNR would have improved its financial performance if it had achieved option (a) approached the Loan Agreement objective in 1981 if it had achieved option (b) and approached the Loan Agreement objective for 1980 and surpassed this objective for 1981 if it had achieved option (c). KNR's failure to meet the financial objectives of the project should consequently be blamed primarily on the inadequacy of ordinary train tariffs but also on the 1979-82 worldwide economic recession.

Sources and Applications of Funds

5.11 KNR's cumulated sources and applications of funds in 1977-81 are as follows. Details are in Table 5.2.

Sources	(W bil)	Applications	(W bil)
Cash generated from operations	134.5	Investments	556.9
Increase in provision for severance pay	8.7	Debt Service	
Government subsidies against operating losses	79.9	Interest	178.4
Government contribution toward investments	84.3	Repayments	124.8
Borrowing	431.9	Total	<u>303.2</u>
Sales of assets	28.8	Total Applications	<u>860.1</u>
<u>Total Sources</u>	<u>768.1</u>	Decrease in Working capital	(92.0)
		<u>Total</u>	<u>768.1</u>

Financing of Debt Service

5.12 To finance its debt service of W 303.2 billion, KNR used the following sources:

	(W bil)
Cash generated from operations	134.5
Increase in severance pay	8.7
Subsidy against operating losses	79.9
Sales of assets	28.8
Subtotal	<u>251.9</u>
Gap (financed through borrowing from Korean Development Bank)	51.3
<u>Total</u>	<u>303.2</u>

Financing of Investments

5.13 To finance its capital investments amounting to W 556.9 billion KNR used the following sources:

	(W bil)
Government contributions	84.3
Borrowing	380.6
Subtotal financing	<u>464.9</u>
Financing gap	92.0
<u>Total</u>	<u>556.9</u>

To finance this gap KNR had to progressively deplete its working capital which became negative starting in 1980, i.e., short-term liabilities exceeded current assets.

Balance Sheet

Short-Term Situation

5.14 Table 5.3 shows that KNR's working capital deteriorated from a positive W 8.9 billion position at the start of the Project to a negative W 90.6 billion by its completion as a result of the above explained shortage in resources for debt service and investment financing. To cover the worsening deficit in working capital KNR had to increase its long-term

borrowing from local sources, which led to heavier interest charges at a time when KNR's gross operating revenue barely covered operating costs. KNR was consequently unable to achieve the 1.5 ratio of current costs to current liabilities provided for under Section 4.04(c) of the Loan Agreement.

Long-Term Situation

5.15 This additional borrowing explains the progressive deterioration of KNR's long debt to equity ratio which fell from 29/71 at the start of the project in 1977 to 38/62 by the end of 1981. This ratio is expected to further deteriorate due to the additional long-term debt KNR incurred to finance the investment component of the Seventh Railway Project. To cover the related debt service KNR will have to generate substantial funds. As its operating costs cannot be significantly reduced the only way to generate these funds is to increase gross operating revenues, which requires that all tariffs fully cover costs.

Remedial Action Taken

5.16 To prevent KNR's future financial performance from being hampered by inadequate tariff policies due to the Government's social or economic considerations the Government and the Bank agreed at negotiations of the Seventh Railway Project that the Government would establish not later than December 31, 1984 a revised KNR tariff structure of KNR which would (a) provide KNR with revenues sufficient to cover all operating costs plus the agreed rate of return on average net fixed assets in use; and (b) ensure that no single tariff would be lower than the KNR's variable cost unless the Government subsidizes the difference between the latter cost and the tariff (Loan 1836-KO Section 4.04 and 4.08 and side letter dated May 21, 1980).

5.17 A comparison between Tables 5.4 (d) and (e) shows that thanks to the above mentioned tariff increases net operating losses incurred by KNR on coal and cement transports were reduced from W 2.96/ton-km and 0.40/ton km respectively in 1980 to W 0.78 and 0.17 in 1981. Calculations prepared during appraisal of the Coal and Cement Distributions project showed that KNR's tariffs as of December 31, 1982 covered 118% and 113% of coal and cement operating costs but were short 2% for coal and 5% for cement to cover full cost including debt service requirements. At negotiations of this project it was agreed that the full cost coverage will be reached by July 1, 1984 for coal and by January 1, 1985 for cement and will be maintained thereafter.

5.18 During the above mentioned negotiations it was also agreed that the Government would:

- (a) adjust KNR's original 1982-86 investment plan to fit the reduction in traffic demand caused by the 1980-82 economic recession; and
- (b) ease the debt service obligations of KNR through subsidies.

6. INSTITUTIONAL PERFORMANCE AND DEVELOPMENT

6.01 KNR's operating productivity is one of the highest in the world, mainly as a result of the action of its highly competent technical management. However, its financial results do not fully reflect this efficiency. This is mainly because KNR's present status as a semi-autonomous agency prevents its management from enjoying the freedom in planning, organizational and financial decision-making needed for facing increasingly fierce competition and adapting to abrupt changes in traffic demand and or economic conditions.

6.02 The government was aware of these deficiencies and therefore agreed to carry out a comprehensive management study under terms of reference agreed with the Bank. This study, which was financed under Loan 1101-KO (Fifth Railway Project), was completed in September 1979. At negotiations of the Sixth Railway Project agreement was reached to implement the study's recommendations in agreement with the Bank (Loan Agreement, Section 3.08).

6.03 The study's main conclusion was that KNR should be gradually transformed into a public corporation in which managerial functions would be delegated, under the guidance of a Board of Directors and the control of the Administrator (renamed President), to three line managers (renamed Executive Vice Presidents) in charge of Planning, Coordination and Control; Operations; and Administration, respectively. The attached chart 20995 shows KNR's recommended organization. This transformation would be preceded by a set of short and medium-term measures focussing on: (a) the establishment of a management information system and an aggressive marketing organization; (b) the strengthening of KNR's capability in the fields of economic analysis for investment planning, financial management and accounting procedures, with special emphasis on implementation of performance budgeting and incremental long-term variable costing; and (c) progressive reorganization of KNR's management along the lines described above to ensure KNR's smooth transition to its new status. During negotiations of the Seventh Railway Project, it was agreed that KNR would become a public corporation no later than January 1, 1987. Agreement was also reached on a timetable for implementing the short and medium-term measures. A team of technical assistants financed from Loan 1836-KO assists KNR in this implementation. This assistance covers the following areas:

- (a) Preparation of a detailed plan of action for transferring KNR into a public corporation;
- (b) Strategic planning;
- (c) Investment planning;
- (d) Performance budgeting;
- (f) Traffic forecasting;
- (g) Marketing;
- (h) Management Information System;
- (i) Commercial accounting;
- (j) Traffic costing and tariffing; and
- (k) Management training.

7. ECONOMIC REEVALUATION

7.01 The Sixth Railway Project financed a two-year slice (1978 and 1979) of the Fourth Five-Year Plan (1977-81). The economic evaluation of the appraisal analyzed separately: (a) the large investments which can be clearly isolated in terms of the benefit they were to generate; and (b) other investments which have a network-wide effect and which benefits cannot be assigned to a particular traffic.

7.02 The large investments analyzed separately, including calculation of an economic return are:

- (a) capacity-increasing investments for increasing freight and passenger services (or 62% of appraisal project costs); and
- (b) way and structures renewals (10%).

The other investments including upgrading the Seoul Suburban Rail System (7%), a passenger car workshop at Daejon (5%) and miscellaneous investments (16%), were evaluated based on their individual objective, without calculating their economic returns as cost-benefit data were lacking.

7.03 The methodology followed for the economic reevaluation is the same as that of the appraisal. For ease of comparison, cost and benefit figures were computed in end-1976 constant prices as for the appraisal. The recalculated rates of return for the main components of the sixth project are as follows compared to appraisal estimates:

ECONOMIC RATES OF RETURN (%)

	Appraisal	Reevaluation
Capacity increase for freight services	40	18
Capacity increase for passenger services (special and limited express trains)	17	28
Way and structures renewals (weighted average on the 8 lines included under the project)	28	28
Overall economic evaluation (for the 3 components above)	30	22

7.04 As a result of changes in project components, the investments for capacity increase for freight and passenger services represent 74% of the total actual cost of the project, compared to 62% at appraisal. The main increase is due to the Chung Bug line double-tracking which in itself represents 28% of the project actual cost (Tables 10 and 11). This added cost has been entirely allocated to freight services, as the Chung Bug line is essentially an industrial line. The combined effect of less freight traffic and higher investment costs resulted in a drop of the ERR to 18% (Table 12).

7.05 The capacity increases for passenger special and limited express services were well justified. In fact, traffic greatly exceeded forecasts as a substantial amount of the demand for rail passenger transport shifted from the ordinary services toward the better services offered by the limited express. The proportion of this traffic increase from 47% of total pass-km in 1977 to 61% in 1982. For 1981, the forecast for limited express passenger traffic amounted to 7 billion pass-km but the actual figure was 8.8 billion. Special express services amounting to about 10% of limited express, however, increased somewhat less than forecast. The return on investments for both types of service combined is 28%, exceeding largely appraisal estimates (Table 13).

7.06 The way and structures renewals were the third investment analyzed at appraisal. It was to amount 10% of total project cost, but due to deferments and changes of priorities, this component amounted only to 7% of actual investments. As expenditures were reduced only for track sections having lesser priority, it is expected that the return on this smaller investment is at least equal, or possibly higher, to the 28% computed at appraisal. However, data were not available to carry out a detailed computation and it was deemed not worth to spend more time on such small investment which return is definitely substantial.

7.07 The weighted overall rate of return is 22% for the three main components of this project, representing about 82% of the total project cost. Despite the premature double-tracking of the Chung Bug line, the overall return is within the range expected at appraisal, mainly because of a very conservative assessment of the traffic forecast, and thus benefits, of passenger services.

8. THE ROLE OF THE BANK

Project Objectives

8.01 The project objectives were in general appropriate, and the agreed modifications of project content and scheduling were justified.

Project Content

8.02 The Bank played an important role in reducing the originally proposed size of the project to what at appraisal was considered technically and economically justified.

8.03 The actual costs of originally included Bank-financed items was in total only 91% of the appraisal estimate (varying from 69% to 111% for individual items). With the Bank's agreement, the main part of the savings was used for procurement of additional passenger cars, needed to meet traffic demand, which up to 1980 increased far beyond the appraisal forecast. In the case of freight traffic the forecast was far too optimistic (in 1981 the forecast exceeded the actual traffic by 29%). Consequently, the agreed quantities of additional freight cars were too high, which resulted in a still existing surplus of freight cars. This situation could have been avoided by using a system of awarding contracts for a basic quantity of say 80% of the estimated requirements with an option to add the remaining 20% as needed considering the traffic development. No further freight cars were included in the seventh project.

Project Implementation

8.04 The project implementation schedule was in general realistic and the Bank's assessment of KNR's implementation capacity was correct or even somewhat on the low side. Although disbursements started about nine months late, the disbursement schedule was in general realistic, as disbursement for all originally included items was completed slightly ahead of schedule.

Operating Forecasts

8.05 Appraisal estimates of operating efficiency were in general realistic; however, the utilization of motive power was somewhat lower than forecast and the utilization of rolling stock declined to levels below forecasts, due to declining traffic.

Financial Performance

8.06 As under previous projects, KNR did not meet the financial objectives of the project. However, this failure is to be blamed on the reduction in traffic demand triggered by the worldwide economic recession started in late 1979 rather than an inadequate tariff increases as was the case in the past. As can be seen in para. 5.05, tariff increases applied

during project implementation were broadly in line with inflation for passengers and exceeded inflation for freight mainly in 1980/81. Thanks to these increases, KNR's losses on freight traffic decreased substantially and coal and cement tariffs as of December 31, 1981, generated a net operating profit. Passenger traffic generated a small net operating profit in 1981 although ordinary train fares were below variable costs and traffic on express trains was stagnant at the previous year's level. The Bank has been instrumental in convincing the Government of the necessity of the above tariff increases.

Institutional Building of KNR

8.07 The Bank has played a useful role in pressing the Government and KNR to undertake the management study and implement its recommendations along lines explained in Chapter 6 of this report.

Bank Supervision

8.08 The scope and schedule of supervision missions were adequate in the context of the borrower's managerial and technical competence. There was good continuity in Bank staff supervising the project.

Working Relationship

8.09 Project preparation and supervision were greatly facilitated by the continued close and open-minded cooperation between Government and KNR officials and Bank staff built-up during preparation and execution of five successive projects. The increasing familiarity of Korean officials with Bank's objectives, procedures, requirements and Bank staff's awareness of Korea's problems and customs led to a smooth and efficient dialogue between the two parties.

9. CONCLUSIONS

9.01 The objectives of the Project were: (a) to increase KNR's capacity to enable it to respond to anticipated increases in passenger and freight traffic demand; (b) to improve operational efficiency; (c) to improve KNR's financial performance through reductions in operating costs and tariff adjustments; (d) to monitor progress of the management study financed from Loan 1101-KO but carried out under Terms of Reference agreed during negotiations of the Fifth project; and (e) to study the feasibility of future railway projects (or transport sector projects including a railway component). Project implementation was generally successful. Physical investments gave KNR the additional capacity it needed; operational efficiency was good; the project's financial objectives would have been reached if traffic had not been adversely affected by the 1980-82 worldwide economic recession; and good progress was made toward the reorganization of KNR.

Physical Component

9.02 Most of the major components included in the original project were completed on schedule. The deferment of implementation of capacity increase investments listed in paras. 3.09-3.10 and of the construction of the Bugog terminal had no detrimental effect on KNR's traffic. The additional works on the Gyeongju by-pass line, the construction and/or extension of stations and the procurement of 37 additional electric railcars for urban traffic were well justified. The only project item which could have been reduced is the number of freight cars which was based on somewhat too optimistic traffic projections. Project costs were substantially in line with appraisal forecasts. The economic return is somewhat below appraisal estimate, but still very good.

9.03 The only physical project item implementation of which raised a problem was the doubling of the whole Chun-Bug line which was not economically justified. The Government's response to the Bank's objections to it i.e., the takeover by the Government of the cost of the part of this doubling not included in the original project was not fully satisfactory. It resulted in transferring the burden of the cost of an uneconomic investment from KNR to the Government while obliging KNR to bear maintenance and operating costs.

Operations

9.04 Thanks to the dedication and high quality of KNR's staff, operating efficiency improved over its already high level during the first two years of project implementation. The decline in utilization of motive power and mainly rolling stock during 1980-82 was due to the stagnation of passenger traffic and the decline in freight traffic.

Finances

9.05 The Government made a commendable effort to raise tariffs mainly for freight, to catch up for their former inadequacy. Unit costs did not decrease as anticipated at project appraisal, partly due to high inflation, but mainly because some project investments were underutilized due to the above-mentioned slowdown in traffic demand. The inadequacy of ordinary passenger trains was a major reason behind KNR's failure to reach the project's financial objective. Despite this major shortcoming, KNR would have met this objective if passenger express trains traffic had grown in 1980-81 at the same rate as over 1977-79. The next step toward the improvement of KNR's financial performance will be the establishment of a cost based tariff system. The Government and the Bank have agreed on a set of measures aimed at reaching this goal as part of the Seventh Railway project (Loan 1836-KO) and the Coal and Cement Distribution project (Loan 2267-KO). KNR's financial performance should improve considerably once its tariff will be cost based and the pick up of traffic will provide for full utilization of investments implemented under the Sixth and Seventh Railway Projects.

Institution Building

9.06 The comprehensive management study carried out by a U.S. consulting firm in association with a Korean consulting firm was completed in September 1979. The study's main conclusion is that KNR should be gradually transformed in a public corporation entrusted with a substantial degree of managerial freedom and financial independence. During negotiations of the Seventh Railway Project it was agreed that this goal should be reached no later than January 1, 1987. Agreement was also reached on a time table for implementing short and medium-term measures recommended by the consultants for assuring a smooth switch in KNR's status and organization. This is being done with the assistance of consultants financed from Loan 1836-KO.

Studies

9.07 As mentioned in para. 3.24, the report on the economic feasibility study of major investments proposed for inclusion in the Seventh Railway project carried out by a team of local and foreign consultants was of mediocre quality.

9.08 The final engineering study for the widening of the Su-In line was successfully completed in February 1982, partly financed from Loan 1542-KO.

Follow up Projects

9.09 The effort undertaken under the first six Korea railway projects are being pursued under the ongoing Seventh project and the Coal and Cement Distribution Project. Completion of the latter project is planned for December 31, 1986 coinciding with the target date for the establishment of KNR as a public corporation. Implementation of the physical and institutional components of the two projects is expected to transform KNR into the operationally efficient and financially viable organization needed for fulfilling its role in the Korean economy.

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Compliance with Main Covenants in the Loan Agreement

Action required	Action taken
<u>Section 3.02</u>	
<p>(a) The Borrower shall, not later than January 1, 1979 or such other date as shall be agreed with the Bank, take all such action as shall be necessary to enable KNR to operate with autonomous powers including, <u>inter alia</u>, the powers (i) to incur debt; (ii) to fix the emoluments of its staff; (iii) to prepare and submit to MOT and EPB its proposed budgets in a commercial form; (iv) to have reasonable flexibility in adjusting approved operating budgets to meet costs changes arising out of unexpected fluctuations in railroad traffic; (v) to open and maintain an account with the Bank of Korea for revenue receipts and payments of obligations; and (vi) to maintain its records in accordance with commercial accounting procedures.</p>	<p>The Borrower has complied with item (VI) commercial accounting. Compliance to the other items is not required since this section is superseded by section 3.02 of Loan Agreement 1836-KO (Seventh Railway Project). Under the latter section KNR will be established not later than January 1, 1987 as a public corporation which will be granted the autonomous powers referred to under items (i) to (v).</p>
<p>(b) The Borrower shall, not later than July 1, 1978 or such other data as shall be agreed with the Bank, furnish to the Bank for review, the measures taken and to be taken to meet the objectives referred to in paragraph (a) of this Section.</p>	<p>Submitted to the Bank in letter of October 13, 1978, from EPB.</p>
<u>Section 3.08</u>	
<p>The Borrower shall cause KNR: (a) to complete and furnish to the Bank for review not latter than June 1, 1979 or such other date as shall be agreed with the Bank, a</p>	<p>The management study was carried out by a U.S. consulting firm in association with a Korean consulting firm.</p>

Action required	Action taken
management study, under terms of reference agreed with the Bank, with a view to making recommendations for strengthening KNR's capability in the fields of (i) investment planning; and (ii) development of technical, financial and economic policies; and (b) to implement thereafter such recommendations as shall be agreed with the Bank.	their final report on September 12, 1979. Implementation of their recommendations has started with technical assistance provided by consulting firm assisted by a U.S. consulting firm. The relevant contract is financed from Loan 1836-K0 (Seventh Railway Project) and is due for completion in mid-1984.

Section 3.09

The Borrower shall ensure that KNR shall not undertake the carrying out of Parts B and C (2) of the Project until the Bank shall have the opportunity to express its views on the findings of the comprehensive urban transport study of the larger Seoul metropolitan areas being undertaken by the Transport Economic Group of the Korea Institute of Science and Technology (KIST).

KIST submitted an interim report to the Office of the mayor of Seoul in late July 1978. The report was highly inadequate and KIST submitted a revised version in early 1979. Reportedly the study did not provide information required for evaluating the proposed investments. Analysis done during appraisal of the Seventh Project show that KNR proposed investments in Seoul suburban services have a satisfactory economic return of 19%. The Bank is financing urban transport studies in Seoul and other cities under the Seventh Railway Project.

Section 3.10

The Borrower shall ensure that KNR shall not undertake the carrying out of Part F (1) of the Project until the Bank shall have the opportunity to express its views on the findings of the studies undertaken by consultants employed by KNR with respect to the construction of the proposed Daejon workshop referred to in said Part F (1) of the Project.

The Bank received during negotiations a report by a Korean Engineering Co. dated September 1977 and covering workshop needs for all kinds of motive power and rolling stock. KNR later submitted a separate report for passenger car maintenance, including a program

Action required	Action taken
<u>Section 3.11</u>	for a new passenger car workshop at Daejon. After review by the Bank, construction of this workshop started in late 1978 and is expected to be completed by end 1983.
<p>The Borrower shall cause KNR to (a) furnish to the Bank for review, not later than December 31, 1978 or such other data as shall be agreed with the Bank, a plan to improve (i) the maintenance; and (ii) the utilization of KNR's locomotives and rolling stocks; and (b) implement such plan thereafter in consultation with the Bank.</p>	A plan to improve the maintenance of locomotives and rolling stock was submitted to the Bank on September 7, 1978. KNR has also given the Bank an acceptable plan to improve the utilization of locomotives and rolling stock.
<u>Section 3.12</u>	KNR undertook several substantial expansions of Project items and additional investments without prior concurrence of the Bank. Justification was provided a posteriori and found acceptable except in case of Chung Bug Line doubling for which the Government has agreed to reimburse KNR. The doubling is now completed.
<p>(a) The Borrower shall take or cause to be taken all action necessary to ensure that substantial changes in KNR's Investment Plan shall only be made with the concurrence of the Bank.</p> <p>(b) For the purpose of this Section "substantial changes" shall mean changes involving in the aggregate either an increase or a decrease of more than 10 billion won (W 10,000,000,000) in the estimated cost of the Investment Plan.</p>	
<u>Section 3.13</u>	The final report was submitted in July 1980. Investments were agreed in the course of appraising the Seventh Project.
<p>The Borrower shall cause KNR to:</p> <p>(a) furnish to the Bank for review, not later than July 1, 1979 or such other date as shall be agreed with the Bank, the findings of the feasibility studies referred to in Part G (5) of the Project; and (b) obtain the concurrence of the Bank before undertaking any investments required for the projects recommended by such studies.</p>	

Action required

Action taken

Section 4.02 (b)

The Borrower shall cause KNR to: ments (balance sheets, statements of income and expenses and related statements) for each fiscal year audited, in accordance with appropriate auditing principles consistently applied, by independent auditors acceptable to the Bank; (ii) furnish to the Bank as soon as available, but in any case not later than five months after the end of each such year, (A) certified copies of its financial statements for such year as so audited and (b) the report of such audit by said auditors, of such scope and in such detail as the Bank shall have reasonably requested; and (iii) furnish to the Bank such other information concerning the accounts and financial statements of KNR and the audit thereof as the Bank shall from time to time reasonably request.

The audit of KNR's account has been done timely every year since 1977. The quality of audit reports has been very good.

Section 4.04

The Borrower shall cause KNR to take all necessary measures (including but not limited to KNR's tariff increases) satisfactory to the Bank as shall be required by KNR to: (a) cover its operating costs (excluding depreciation) and debt service requirements and finance a reasonable proportion of its capital expenditures commencing fiscal year 1979; (b) earn an annual rate of return of not less than (i) 2% in fiscal year 1979; (ii) 3.2% in fiscal year 1980; (iii) 4% thereafter; and (c) attain a ratio of current assets to current liabilities of not less than 1.5 by fiscal year 1979.

Tariffs were increased as follows:

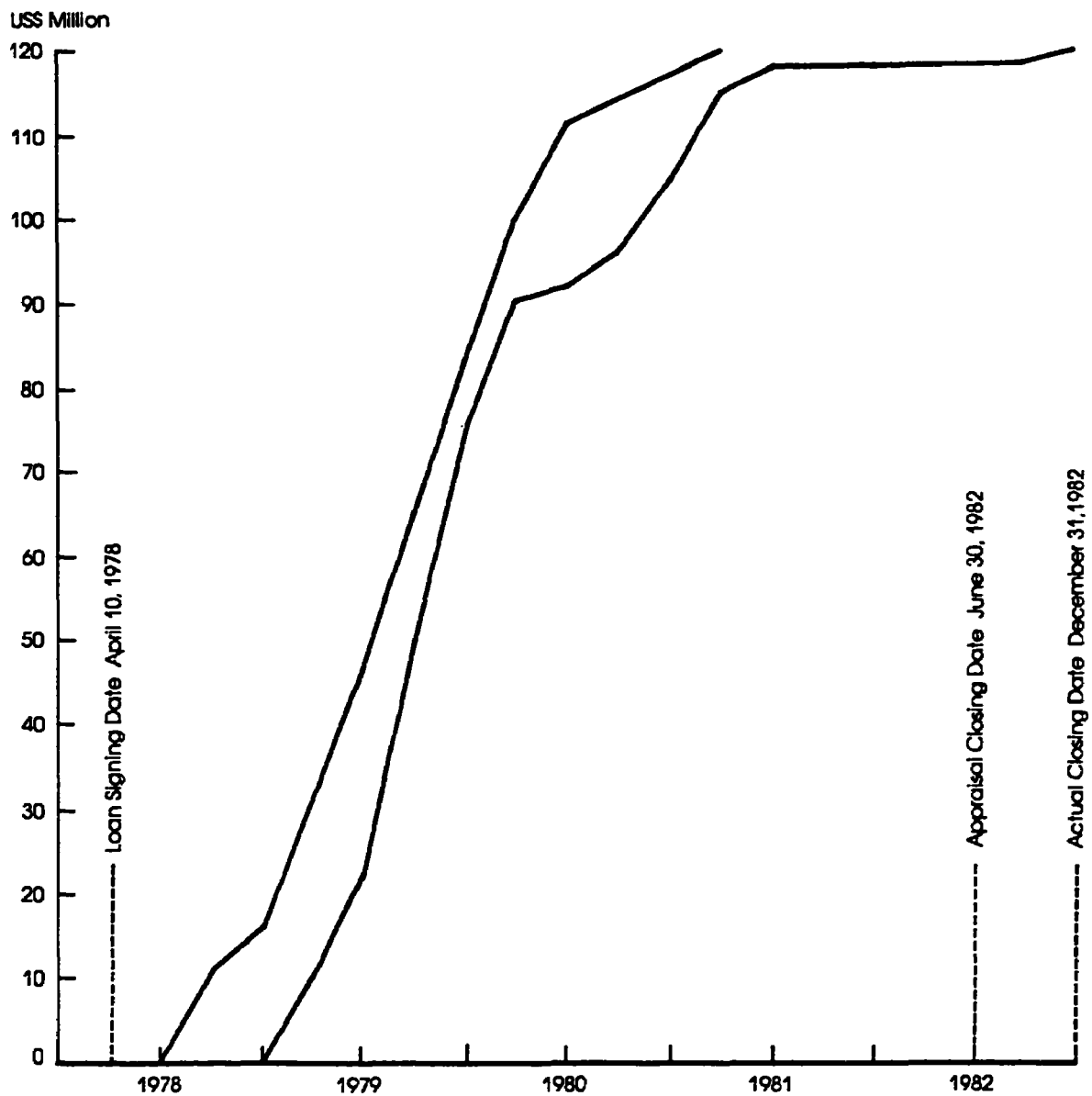
	<u>Freight</u>	<u>Passengers</u>
	(%)	(%)
6/78	15	19
5/79	10	15
1/80	20	20
8/80	20	20
6/81	22	13.5/a
12/81	12	5
7/82	5	5
12/82	5	5

However, due to lower than expected traffic growth explained by a slow down in the country's economic growth, KNR

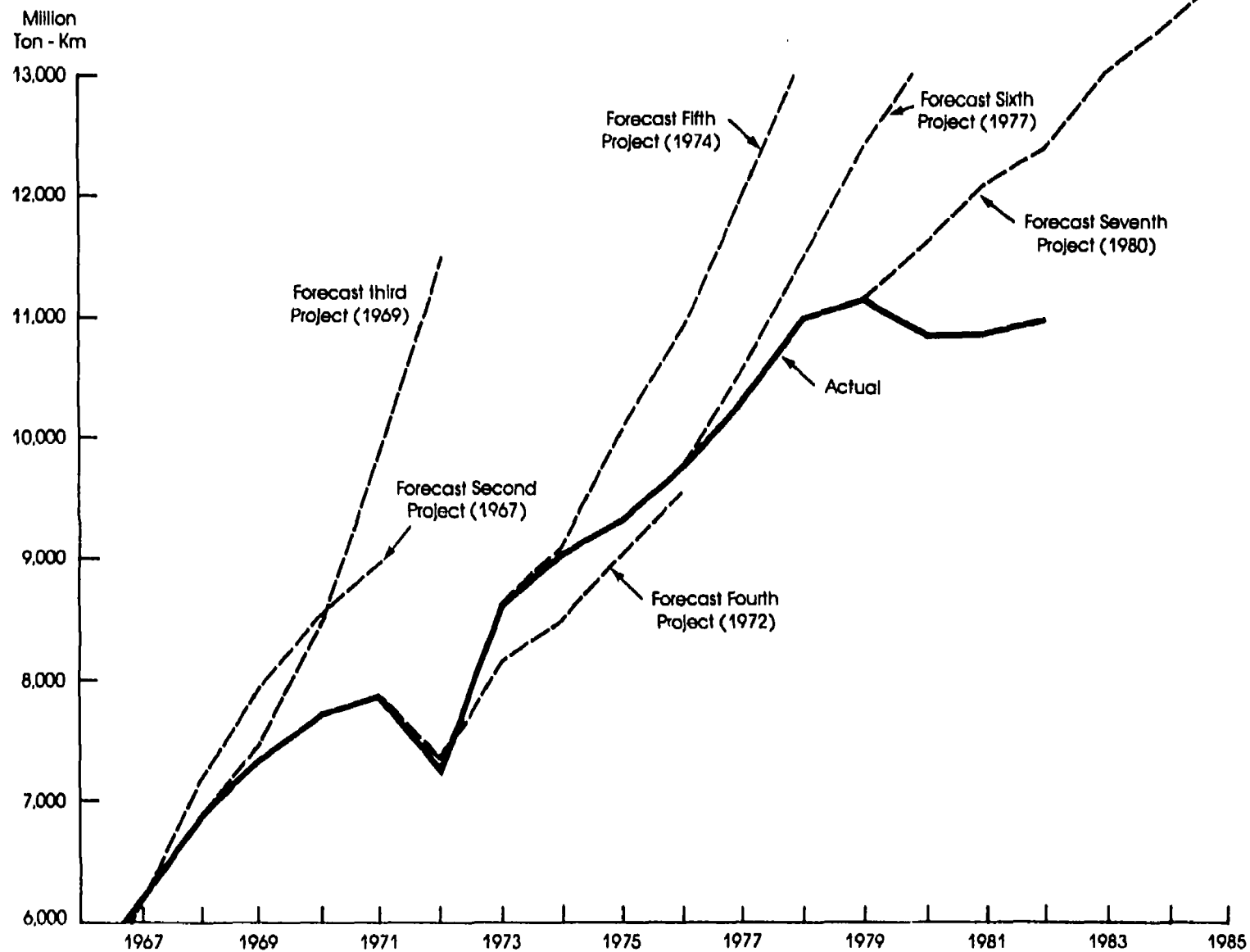
/a Except for coal tariffs which were increased by 35%.

Action required	Action taken
<u>Section 4.09</u>	has not been able to meet its financial objectives despite substantial tariff increases.
The Borrower shall:	
(a) not later than July 1, 1980 or such other date as shall be agreed with the Bank, carry out and furnish to the Bank for review transport sector studies, under terms of reference agreed with the Bank, with a view to preparing feasibility studies of future transport investment projects to be carried out by the Borrower's departments, agencies and public corporations involved in the transport sector; and	The consultants selected (Korea Institute for Science and Technology - KIST, plus individual foreign experts) to carry out the coal/cement distribution study as well as the National Comprehensive Transport Study, issued a final report on the coal/cement distribution study in June 1980. However, the report was not acceptable to the Bank. The Coal and Cement Project was designed jointly by KNR, the Korea Maritime and Ports Administration (KMPA), the Ministries of Energy and Resources (MOER), Commerce and Industry (MCI), Finance (MOF) and the Economic Planning Board (EPB) under the coordination of the Ministry of Transportation (MOT). The related loan will be submitted for Bank Board approval in late April 1983. The Bank team in charge of drafting the Korea Transport Sector Issues Survey initiated three transport sector studies. Two of these, the Seoul Busan Transport Corridor Study and the Seoul Region Transport Area Study are expected to start shortly. The scope and timing of the Third one, the South-eastern Industrial Belt Study, are under discussion between the Government and the Bank.
(b) employ consultants whose qualifications, experience and terms and conditions of employment shall be satisfactory to the Bank to assist the Borrower in carrying out the said transport sector studies.	

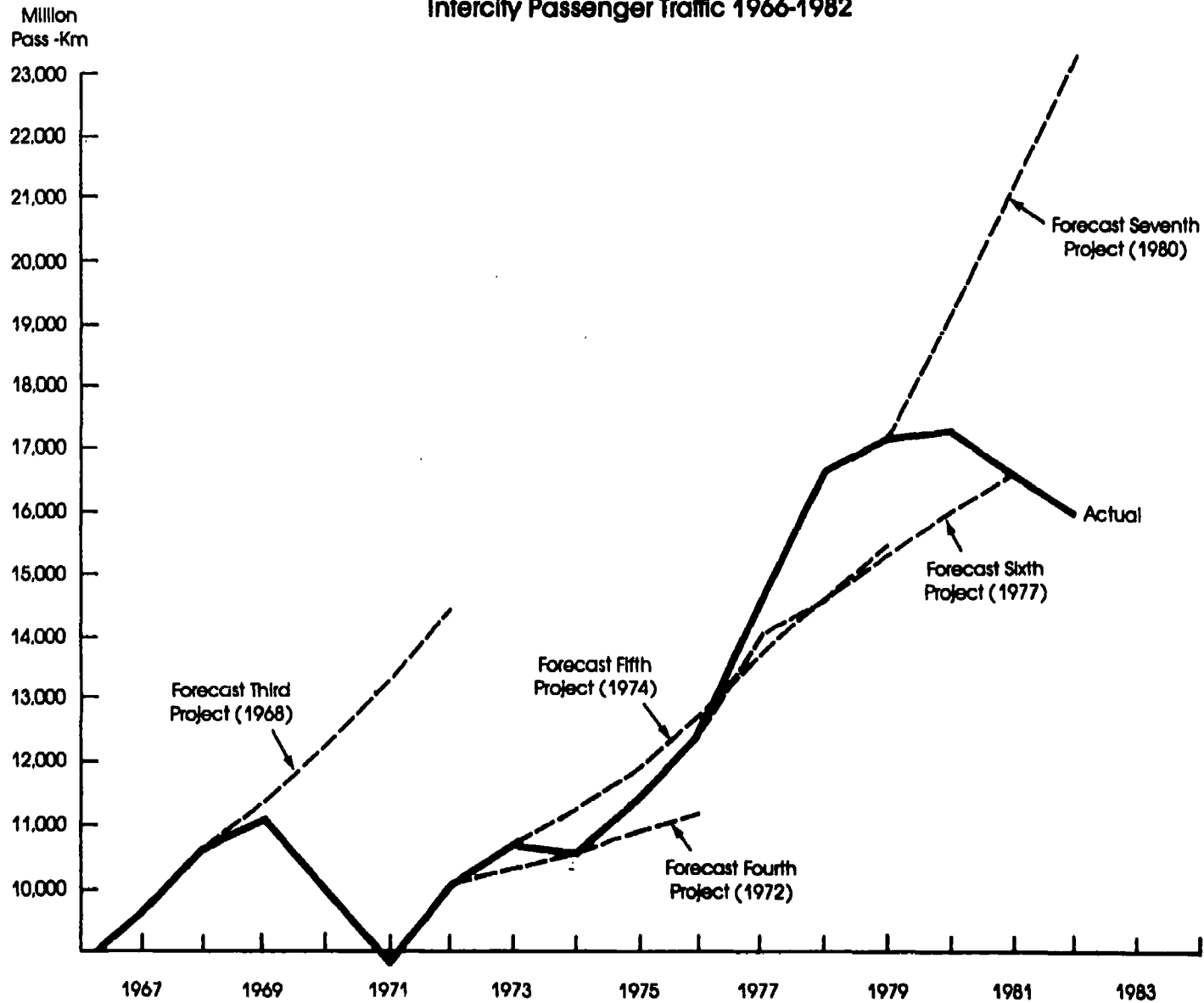
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PROJECT COMPLETION REPORT
Disbursements



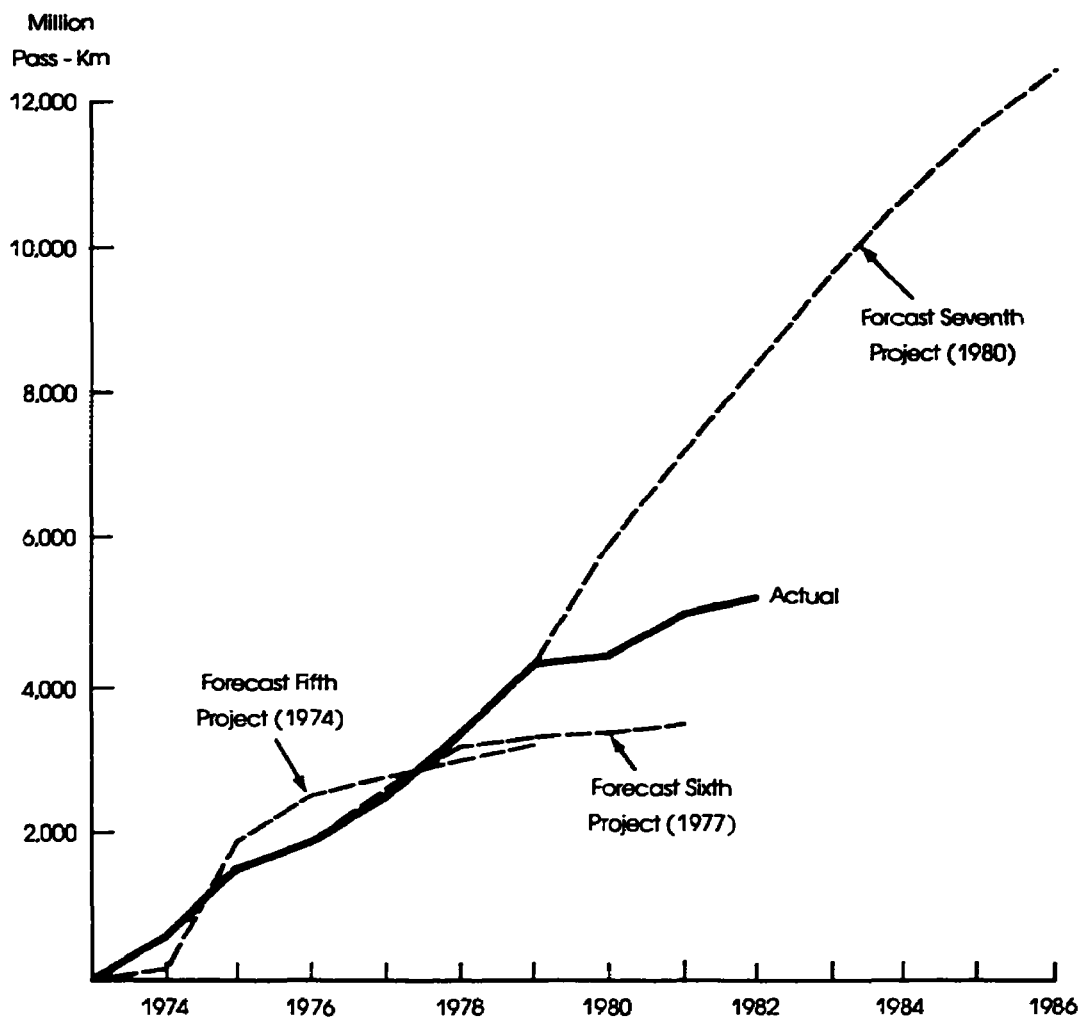
**KOREA
SIXTH RAILWAY PROJECT (Loan 1542-KO)
PROJECT COMPLETION REPORT
Freight Traffic 1968-1982**



**KOREA
SIXTH RAILWAY PROJECT
PROJECT COMPLETION REPORT
Intercity Passenger Traffic 1966-1982**



KOREA
SIXTH RAILWAY PROJECT (Loan 1542-KO)
PROJECT COMPLETION REPORT
KNR Seoul Urban Passenger Traffic 1974-1982



KOREA
SIXTH RAILWAY PROJECT (LOAN 1542-KO)
PROJECT COMPLETION REPORT

Project Quantities

		Appraisal estimate			Actual					Index (appraisal estimate for 1978-81 = 100)				
	Unit	1978/79	1980/81	Total 1978-81	1978/79	1980/81	Total 1978-81	Carryover to 1982 or later	Project total	Deferred to 1983 or later	1978-81	Carryover to 1982 or later	Project total	Deferred to 1983 or later
New Line Construction														
Siding for Changwon machinery complex	Index	110	-	110	100	120	220	30	250	-	200	27	227	-
Other items	Index	110	-	110	-	-	-	-	-	110	-	-	-	100
Electrification	km	8.5/a	-	8.5/a	-	-	-	-	-	8.5/a	-	-	-	100
Increase in Station and Line Capacity														
Double tracking - Chung Ang line	Index	110	-	110	1,250	750	2,000	-	2,000	-	1,818	-	1,818	-
Double tracking - Yongseon-Buseong	km	-	9.6/a	9.6/a	-	-	-	-	-	9.6/a	-	-	-	100
Double tracking - Seongbuk-Euljeonbu	km	-	13.1/a	13.1/a	-	-	-	-	-	13.1/a	-	-	-	100
Bypass line - Gyeongju	Index	110	-	110	110	60	170	330	500	-	155	300	455	-
Marshalling yard extensions	Places	1.5/a	0.5/a	2.0/a	-	-	-	-	-	2.0/a	-	-	-	100
Freight terminal - Bugog	Index	55	55	110	100	150	250	-	250	-	227	-	227	-
Freight terminal - West Seoul	Index	36	74	110	-	-	-	-	-	110	-	-	100	-
Station buildings	Index	110	-	110	1,500	-	1,500	-	1,500	-	1,364	-	1,364	-
CTC - Yeongju-Gyeongju	km	54.5/a	109.0/a	163.5/a	-	-	-	-	-	163.5/a	-	-	-	100
CTC - Dongdaegu-Yongcheon	km	34.9/a	-	34.9/a	-	-	-	-	-	34.9/a	-	-	-	100
Other items	Index	90	20	110	70	-	70	-	70	40	64	-	64	36
Way and Structures														
Rail renewal, 50 kg rails	km	260	-	260	255	-	255	-	255	5	98	-	98	2
Track renewal, 50 kg rails	km	70	-	70	20	-	20	-	20	50	29	-	29	71
Concrete sleepers	'000	150/a	-	150/a	90	-	90	-	90	75	55	-	55	45
Ballast	'000 cu m	320/a	-	320/a	34	-	34	-	34	318	10	-	10	90
Separation of rail and road level	Places	59/a	-	59/a	23	-	23	-	23	42	35	-	35	65
Track material workshop	Index	100	-	100	40	80	120	-	120	-	120	-	120	-
Right-of-way improvements	Index	110	-	110	60	-	60	-	60	50	55	-	55	45
Other items	Index	110	-	110	125	-	125	-	125	-	114	-	114	-
Motive Power and Rolling Stock														
New diesel main-line locomotives	Number	30	-	30	20	7	27	-	27	3	90	-	90	10
New breakdown cranes	Number	2	-	2	-	2	2	-	2	-	100	-	100	-
Diesel locomotives, remodeling	Number	59	-	59	31	40	71	-	71	-	120	-	120	-
New special express passenger cars	Number	45	-	45	45	-	45	-	45	-	100	-	100	-
New limited express passenger cars	Number	166	-	166	38	163	201	-	201	-	121	-	121	-
New box cars	Number	550	-	550	188	362	550	-	550	-	100	-	100	-
New gondolas	Number	870	-	870	621	249	870	-	870	-	100	-	100	-
Freight car improvement	Index	100	-	100	20	-	20	-	20	-	20	-	20	-
Other items	Index	100	-	100	80	-	80	-	80	-	80	-	80	-
Rolling Stock Repair Facilities														
New Daeseon passenger car repair facilities	Index	27	83	110	15	55	70	40	110	-	64	36	100	-
Improvement of existing backshops	Index	110	-	110	10	-	10	-	10	100	8	-	8	92
Improvement of existing sheds	Index	110	-	110	60	-	60	-	60	50	55	-	55	45
Telecommunications, Power Facilities and Others														
Telecommunications	Index	110	-	110	40	-	40	-	40	70	36	-	36	64
Power facilities	Index	110	-	110	25	-	25	-	25	85	23	-	23	77
Buildings	Index	110	-	110	90	-	90	-	90	20	82	-	82	18
Housing facilities	Index	110	-	110	80	-	80	-	80	30	73	-	73	27
Training and technical assistance	Index	110	-	110	60	25	85	25	110	-	77	23	100	-
Other items	Index	110	-	110	125	-	125	-	125	-	113	-	113	-

/a Plus 10% physical contingency.

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Cost of Items Not Included in the Project
(won million)

<u>Additional items</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
Improvement of stations for electric operation	8,987	-	8,987
New station of Jeonju <u>/a</u>	2,995	-	2,995
Electric rail cars for SMESRS (37)	10,886	-	10,886
Other items	1,664	30	1,664
<u>Total</u>	<u>24,532</u>	<u>30</u>	<u>24,562</u>

/a Required and financed by the Government.

Table 3.3

KOREA
SIXTH RAILWAY PROJECT (LOAN 1542-KO)
PROJECT COMPLETION REPORT

Procurement Schedule for Bank Financed Items

		Events							
		I	II	III	IV	V	VI	VII	VIII
Rails (33,000 tons)	Appraisal	03/01/78	03/15/78	05/15/78	-	06/15/78	07/01/78	01/01/79	10/01/79
	Actual	04/04/78	04/13/78	06/16/78	10/30/78	11/14/78	11/17/78	02/24/79	12/30/79
Permanent way workshop machinery	Appraisal	04/01/78	04/15/78	07/15/78	-	08/15/78	09/01/78	03/01/79	09/01/79
	Actual	01/04/79	07/20/79	10/11/79	02/28/80	03/14/79	03/27/80	09/15/80	01/03/81
Track maintenance equipment, original quantities	Appraisal	03/01/78	03/15/78	05/15/78	-	06/15/78	07/01/78	01/01/79	06/01/79
	Actual	04/21/78	05/09/78	06/28/78	07/31/78	08/15/78	09/01/78	12/16/78	06/28/79
Track maintenance equipment, additional:									
- Track inspection car (1) /a	Appraisal	-	-	-	-	-	-	-	-
- First bidding	Actual	08/12/80	09/25/80	12/02/80	Rebidding	-	-	-	-
- Rebidding	Actual	-	06/22/81	08/07/81	09/22/81	09/28/81	10/02/81	12/15/82	12/15/82
- Rail flow detectors (12) /b	Appraisal	-	-	-	-	-	-	-	-
	Actual	11/27/80	12/16/80	01/20/81	03/19/81	04/01/81	04/13/81	05/29/81	05/29/81
Breakdown cranes (2)	Appraisal	03/15/78	04/01/78	06/15/78	-	07/15/78	08/01/78	06/01/79	07/01/79
	Actual	04/19/78	05/09/78	07/11/78	Rebidding	-	-	-	-
- First bidding	Actual	-	08/09/78	09/28/78	12/16/78	12/19/78	12/22/78	02/06/80	02/06/80
Passenger cars, original quantities:									
- Special express cars (45)	Appraisal	03/15/78	04/01/78	06/15/78	-	07/15/78	08/01/78	08/01/79	02/01/80
	Actual	05/11/78	05/16/78	08/01/78	12/18/78	12/21/78	12/22/78	02/19/79	09/19/79
- Limited express cars (166)	Appraisal	03/15/78	04/01/78	06/15/78	-	07/15/78	08/01/78	08/01/79	02/01/80
	Actual	05/11/78	05/16/78	08/01/78	12/18/78	12/21/78	12/22/78	05/15/80	01/03/81
Passenger cars, additional:									
- Limited express coaches (31) /c	Appraisal	-	-	-	-	-	-	-	-
	Actual	01/26/78	01/31/79	04/03/79	06/28/79	06/29/79	07/04/79	07/12/79	07/12/79
- Limited express power source cars (4) /c	Appraisal	-	-	-	-	-	-	-	-
	Actual	-	-	-	02/17/79	02/22/79	03/20/79	12/06/79	12/10/79
- Spare parts /d	Appraisal	-	-	-	-	-	-	-	-
	Actual	04/28/80	05/06/80	06/25/80	11/10/80	11/26/80	12/02/80	02/13/81	09/02/81
Freight cars (1420)	Appraisal	03/15/78	04/01/78	06/15/78	-	07/15/78	08/01/78	04/01/79	04/01/80
	Actual	05/11/78	05/16/78	08/01/78	12/18/78	12/21/78	12/22/78	05/02/79	01/21/80
Rolling stock workshop equipment	Appraisal	01/15/79	02/01/79	05/15/79	-	06/15/79	07/01/79	01/01/80	01/01/81
	Actual	02/16/79	02/21/79	04/27/79	09/05/79	09/19/79	09/29/79	12/28/79	10/03/80

Events:	I	Bank's agreement on tender documents.	/a	Item agreed to in Bank's telex 06/11/80.
	II	Bid invitation.	/b	Item agreed to in Bank's telex 11/26/80.
	III	Bid opening	/c	Item agreed to in Bank's telex 12/28/78;
	IV	Submission of bid evaluation and award proposal to the Bank.		Procured through change order.
	V	Bank's agreement to award of contract.	/d	Item agreed to in Bank's telex 01/28/80.
	VI	Contract date.		
	VII	Start of delivery.		
	VIII	Completion of delivery.		

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SIXTH RAILWAY PROJECT (LOAN 1542-KO)

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Estimated and Actual Time (days) for Procurement Steps

	Delay in preparation of bid docs/ <u>a</u>	Completion of bid documents (From event I to event II)		Bid submission (From event II to event III)		Bid evaluation (From event III to event IV)		Bank reviewed of bid evaluation (From event IV to event V)		Award of contract (From event V to event VI)		Total bidding (From event I to event VI)		Delivery (From event VI to event VIII)		Total procurement (From event I to event VIII)	
		Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual
Rail (33,000 tons)	34	14	9	61	64	16	136	13	13	16	3	122	227	457	408	579	635
Permanent way workshop machinery	278	14	197	93	83	16	140	13	13	17	13	155	448	365	309	520	757
Track maintenance equipment, original quantities	51	14	43	61	50	16	33	13	13	16	17	122	160	335	301	457	461
Track maintenance equipment, additional:																	
- Track inspection car (1) <u>/b</u>	-	-	44	-	68	Rebidding	-	-	-	-	-	-	-	-	-	-	-
- First bidding	-	-	-	-	46	-	46	-	6	-	4	-	102	-	74	-	176
- Rebidding	-	-	-	-	46	-	46	-	6	-	4	-	102	-	74	-	176
- Rail flow detectors (12) <u>/c</u>	-	-	20	-	35	-	58	-	13	-	12	-	138	-	46	-	184
Breakdown cranes (2)																	
- First bidding	35	17	20	75	63	Rebidding	-	-	-	-	-	92/f	83/f	-	-	-	-
- Rebidding	-	17	20	75	50	15	79	13	3	17	3	139	155	334	411	473	566
Passenger cars, original quantities:																	
- Special express cars (43)	57	17	5	75	77	15	139	13	3	17	1	139	225	549	281	688	506
- Limited express cars (166)	57	17	5	75	77	15	139	13	3	17	1	139	225	549	799	688	1,024
Passenger cars, additional:																	
- Limited express coaches (31) <u>/d</u>	-	-	5	-	62	-	86	-	1	-	3	-	157	-	8	-	165
- Limited express power source cars (4) <u>/d</u>	-	-	-	-	-	-	-	-	5	-	26	-	31	-	264	-	295
- Spare parts <u>/e</u>	-	-	8	-	50	-	138	-	16	-	6	-	218	-	274	-	492
Freight cars (1420)	57	17	5	75	77	15	139	13	3	17	1	139	225	608	393	747	620
Rolling stock workshop equipment	32	17	5	103	65	16	131	13	14	16	10	167	225	549	369	716	594

Events: I Bank's agreement on tender documents.

II Bid invitation.

III Bid opening

IV Submission of bid evaluation and award proposal to the Bank.

V Bank's agreement to award of contract.

VI Contract date.

VII Start of delivery.

VIII Completion of delivery.

/a Time from appraisal estimate of date for Bank agreement on tender document to actual date.

/b Item agreed to in Bank's telex 06/11/80.

/c Item agreed to in Bank's telex 11/26/80.

/d Item agreed to in Bank's telex 12/28/78; Procured through change order.

/e Item agreed to in Bank's telex 01/28/80.

/f Only time up to bid invitation.

Table 3-4

KOREA
SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Project Costs (Won million)

	<u>Appraisal estimate in-</u> <u>cluding contingencies</u>			<u>Actual</u>			<u>Total</u> <u>cost</u> <u>index/a</u>	<u>Quantity</u> <u>index/a</u>	<u>Price</u> <u>index/b</u>
	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>			
<u>New Line Construction</u>									
Siding for Changweon machinery comple	2,841	-	2,841	9,206	-	9,206	324	237	137
Other items	125	-	125	-	-	-	-	-	-
Subtotal New Line Construction	<u>2,966</u>	<u>-</u>	<u>2,966</u>	<u>9,206</u>	<u>-</u>	<u>9,206</u>	<u>324</u>	<u>237</u>	<u>137</u>
<u>Electrification</u>	1,065	1,103	2,168	-	-	-	-	-	-
<u>Increase in Station and Line Capacity</u>									
Double tracking Chung Bug line	2,385	249	2,634	64,839	2,769	67,628	2,624	1,818	141
Double tracking Yongsan-Susaeg	3,952	1,444	5,036	644/c	-	644/c	13	10	130
Double tracking Seongbug-Euijeonbu	4,942	2,029	6,971	435/c	-	435/c	6	5	130
By-pass line Gyeongju	982	101	1,083	8,301	-	8,301	766	455	169
Marshalling yard extensions	2,903	193	3,096	-	-	-	-	-	-
Freight terminal Bugog /d	2,205	-	2,205	7,747	282	8,029	364	227	160
Freight terminal West Seoul	1,714	-	1,714	-	-	-	-	-	-
Station buildings	154	-	154	2,478	-	2,478	1,609	1,364	118
CTC (about 200 km)	10,300	-	10,300	-	-	-	-	-	-
Other items	11,064	778	11,842	9,367	-	9,367	79	64	124
Subtotal Incr. in Station and Line Capacity	<u>40,241</u>	<u>4,794</u>	<u>45,035</u>	<u>93,831</u>	<u>3,051</u>	<u>96,882</u>	<u>215</u>	<u>152</u>	<u>142</u>
<u>Way and Structures</u>									
Rail renewal, 50 kg rails	1,666	5,101	6,767	1,285	4,222	6,207	92	98	94
Track renewal, 50 kg rails	2,668	1,382	4,080	702	386	1,088	27	29	94
Concrete sleepers	2,632	-	2,632	1,666	-	1,666	63	55	116
Ballast	1,643	-	1,643	183	-	183	11	10	115
Separation of rail & road level at crossings	9,725	-	9,725	3,098	-	3,098	32	35	90
Track material workshop	565	1,231	1,796	977	1,480	2,457	137	120	114
Right-of-way improvements	4,062	-	4,062	3,023	-	3,023	74	55	136
Other items	3,321	537	3,858	3,731	1,458	5,189	134	114	118
Subtotal Way and Structures	<u>26,282</u>	<u>8,251</u>	<u>34,533</u>	<u>14,665</u>	<u>8,246</u>	<u>22,911</u>	<u>66</u>	<u>63</u>	<u>106</u>
<u>Motive Power and Rolling Stock</u>									
New diesel main line locomotives	173	12,517	12,690	4,957	7,178	12,135	96	90	106
New breakdown cranes	29	783	812	31	635	666	82	100	82
Diesel locomotive remodeling	1,698	10,109	11,807	1,665	9,963	11,628	98	120	82
New special express passenger cars	1,621	8,041	9,662	77	6,954	7,031	73	100	73
New limited express passenger cars	3,208	15,929	19,137	3,348	20,834	24,172	126	121	104
New freight cars	-	22,332	22,332	70	21,544	21,614	97	100	97
Improvement of freight cars	4,317	-	4,317	850	-	850	20	20	98
Other items	2,468	471	2,939	2,544	-	2,544	86	80	103
Subtotal Motive Power and Rolling Stock	<u>13,514</u>	<u>70,182</u>	<u>83,696</u>	<u>13,532</u>	<u>67,108</u>	<u>80,640</u>	<u>96</u>	<u>99</u>	<u>97</u>

Table 3.5
Page 2 of 2

	Appraisal estimate including contingencies			Actual			Total cost index/a	Quantity index/a	Price index/b
	Local	Foreign	Total	Local	Foreign	Total			
Rolling Stock Repair Facilities									
New Daejeon passenger car shop	8,572	3,554	12,126	15,467	2,030	17,497	144	100	144
Improvement of existing backshops	1,115	2,571	3,686	389	-	389	10	8	127
Improvement of existing sheds	2,852	1,093	3,945	2,545	-	2,545	65	55	118
Subtotal Rolling Stock Repair Facilities	12,539	7,218	19,757	18,401	2,030	20,431	103	74	140
Telecommunications, Power Facilities									
Buildings & Others									
Telecommunications	1,387	-	1,387	584	-	584	42	36	116
Power facilities	1,130	63	1,193	295	-	295	25	23	110
Buildings	1,370	-	1,370	1,254	-	1,254	92	82	112
Housing facilities	1,675	-	1,675	1,469	-	1,469	88	73	121
Training & technical assistance	129	381	510	-	596	596	117	100	117
Other items	2,814	-	2,814	3,623	-	3,623	128	114	113
Subtotal Telecommunications, Power Fac. Bldg. & Others	8,508	444	8,943	7,225	596	7,821	87	76	115
Total Project	105,112	91,992	197,104	156,860	81,031	237,891	121	102	118
Nonproject items (Table 2)	-	-	-	24,532	30	24,532	-	-	118
Total Expenditures	105,112	91,992	197,104	181,392	81,061	262,453	133	113	118

/a Appraisal estimate = 100. See Table 1.

/b Appraisal cost level = 100.

/c Cost for land acquisition only.

/d Project completely changed. Completion expected by 1984. Only costs for 1978-1981 included here.

KOREA
SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Project Quantities and Costs

	Project quantities						Project costs (Won million)											
	At appraisal cost level			At appraisal cost level			At appraisal cost level			At appraisal cost level			At appraisal cost level			At appraisal cost level		
	Appraisal estimate /a	Actual	Quantity index /b	Appraisal estimate /a	Executed part of appraisal quantities /c	Cost index /b	Appraisal estimate /a	Executed part of appraisal quantities /c	Cost index /b	Appraisal estimate /a	Executed part of appraisal quantities /c	Cost index /b	Appraisal estimate /a	Executed part of appraisal quantities /c	Cost index /b	Appraisal estimate /a	Executed part of appraisal quantities /c	Cost index /b
New line construction	Index 100 + 10%/a	Index 250/h	227	2,966	2,841	96	125	4	3,900	131	6,741	227	4,051	143	3,155	132	9,206	137
Electrification /i	8.5 km + 10%/a	-	-	2,168	-	-	2,168	100	-	-	-	-	-	-	-	-	-	-
Increase in Station and Line Capacity																		
Double tracking - Chung Bug line	Index 100 + 10%/a	Index 2,000/h	1,818	2,634	2,634	100	-	-	45,257	1,718	47,891	1,818	3,720	141	63,908	141	67,628	141
Double tracking - Yongseon-Suseong /i	9.6 km + 10%/a	-	(10)	3,016	495/j	10	4,541	90	-	-	495/j	10	644/j	130	-	644/j	130/h	
Double tracking - Seongbuk-Kuljeonbu /i	13.1 km + 10%/a	-	(5)	8,971	335/j	5	6,678	95	-	-	335/j	5	435/j	130	-	435/j	130/h	
Bypass line - Gyeongju	Index 100 + 10%/a	Index 500/h	455	1,083	1,083	100	-	-	3,840	355	4,925	455	1,826	169	6,475	169	8,301	169
Marshalling yard extension /i	2 places + 10%/a	-	-	3,096	-	-	3,096	100	-	-	-	-	-	-	-	-	-	-
Freight terminal - Bugog /a	Index 100 + 10%/a	Index 250/h	227	2,205	2,205	100	-	-	2,806	127	3,011	227	3,535	160	4,496	160	8,029	160
Freight terminal - West Seoul /i	Index 100 + 10%/a	-	-	1,714	-	-	1,714	100	-	-	-	-	-	-	-	-	-	-
Station buildings	Index 100 + 10%/a	Index 1,500/h	1,364	154	154	100	-	-	1,946	1,264	2,100	1,364	182	118	2,296	118	2,478	118
CTC installations /i	198.4 km + 10%/a	-	-	10,100	-	-	10,100	100	-	-	-	-	-	-	-	-	-	-
Other items	Index 100 + 10%/a	Index 70/h	64	11,842	7,535	64	4,307	36	-	-	7,535	64	9,367	124	-	9,367	124	-
Subtotal				45,035	14,441	32	30,594	69	53,849	120	68,290	152	19,702	136	22,175	143	96,882	142
Way and Structures																		
Rail renewal, 50 kg rails	260 km	255 km	98	6,767	6,637	98	130	2	-	-	6,637	98	6,207	94	-	6,207	94	-
Track renewal, 50 kg rails	70 km	20 km	29	4,050	1,157	29	2,893	71	-	-	1,157	29	1,088	94	-	1,088	94	-
Concrete sleepers	150,000 + 10%/a	90,000	55	2,672	1,455	55	1,197	45	-	-	1,455	55	1,646	116	-	1,646	116	-
Ballast	320,000 cu m + 10%/a	34,000 cu m	10	1,443	158	10	1,484	90	-	-	158	10	183	115	-	183	115	-
Separation of rail and road level at crossings	59 places + 10%/a	21 places	35	9,725	3,446	35	6,279	65	-	-	3,446	35	3,096	90	-	3,096	90	-
Track material workshop	Index 100	Index 120	120	1,796	1,796	100	-	-	359	20	2,155	120	2,067	114	410	114	2,457	114
Right-of-way improvements	Index 100 + 10%/a	Index 60	55	4,062	2,315	55	1,847	45	-	-	2,315	55	3,023	136	-	3,023	136	-
Other items	Index 100 + 10%/a	Index 125	114	3,858	3,858	100	-	-	576	14	4,364	114	6,566	118	623	118	5,109	118
Subtotal				34,333	20,703	40	13,830	40	883	3	21,566	61	21,878	106	1,031	117	22,911	106
Motive Power and Rolling Stock																		
New diesel main-line locomotives	30	27	90	12,690	11,421	90	1,269	10	-	-	11,421	90	12,135	96	-	12,135	106	-
New breakdown cranes	2	2	100	812	812	100	-	-	-	-	812	100	666	82	-	666	82	-
Diesel locomotives, remodeling	59	71	120	11,807	11,807	100	-	-	2,401	20	14,208	120	9,665	82	1,965	82	11,638	82
New special express passenger cars	45	45	100	9,662	9,662	100	-	-	-	-	9,662	100	7,031	73	-	7,031	73	-
New limited express passenger cars	168	201	121	19,137	19,137	100	-	-	4,035	21	23,172	121	19,545	104	4,209	104	24,172	104
New freight cars	1,423	1,420	100	22,332	22,332	100	-	-	-	-	22,332	100	21,614	97	-	21,614	97	-
Improvement of freight cars	Index 100/f	Index 20/h	20	4,317	863	20	1,454	80	-	-	863	20	850	98	-	850	98	-
Other items	Index 100/f	Index 80/h	80	2,939	2,939	80	588	20	-	-	2,351	80	2,544	108	-	2,544	108	-
Subtotal				82,696	78,385	94	3,311	6	6,436	5	84,821	99	74,466	95	6,174	96	80,640	95
Rolling Stock Repair Facilities																		
New passenger car shop	Index 100 + 10%/a	Index 110/h	100	12,126	12,126	100	-	-	-	-	12,126	100	17,497	144	-	17,497	144	-
Improvement of existing shops	Index 100 + 10%/a	Index 8	8	3,684	307	8	3,379	92	-	-	307	8	309	127	-	309	127	-
Improvement of existing sheds	Index 170 + 10%/a	Index 60/h	55	3,945	2,152	55	1,793	45	-	-	2,152	55	2,545	118	-	2,545	118	-
Subtotal				19,757	14,585	74	5,172	26	-	-	14,585	74	20,431	140	-	20,431	140	-
Telecommunications, Power Facilities, Buildings and Others																		
Telecommunications	Index 100 + 10%/a	Index 40/h	36	1,387	504	36	883	64	-	-	504	36	564	116	-	564	116	-
Power facilities	Index 100 + 10%/a	Index 25/h	23	1,193	268	23	923	77	-	-	268	23	295	110	-	295	110	-
Buildings	Index 100 + 10%/a	Index 90/h	82	1,370	1,121	82	249	18	-	-	1,121	82	1,234	112	-	1,234	112	-
Housing facilities	Index 100 + 10%/a	Index 80/h	73	1,675	1,218	73	457	27	-	-	1,218	73	1,469	121	-	1,469	121	-
Training and technical assistance	Index 100 + 10%/a	Index 110/h	100	510	510	100	-	-	-	-	510	100	506	117	-	506	117	-
Other items	Index 100 + 10%/a	Index 125/h	114	2,814	2,814	100	-	-	384	14	3,198	114	3,180	115	495	115	3,683	115
Subtotal				8,949	6,435	72	2,314	28	384	4	8,819	74	7,386	115	435	113	7,821	115
Total Project				192,104	137,390	70	59,714	30	65,454	33	202,644	103	247,919	108	89,972	137	237,891	117
Nonproject items (Table 2)				-	-	-	-	-	20,993	-	20,993	-	-	-	20,962	117/h	24,542	117/h
Total Expenditures				192,104	137,390	70	59,714	30	86,447	44	223,637	144	267,912	108	110,934	132	262,433	117

/a Including contingencies.
 /b Appraisal estimate = 100.
 /c Appraisal cost = quantity index/100 (index maximum = 100).
 /d Additional quantities of project items but not additional items.
 /e Actual cost = 100/quantity index (index minimum = 100).
 /f Appraisal cost level = 100.
 /g Physical contingency = 10%.
 /h Unestimated.
 /i Deferred.
 /j Cost only for land acquisition.
 /k Item changed and deferred. Cost shown is for land acquisition and part of earthworks.

Table 4.1

KOREA
SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Freight Traffic 1967-82
(Million ton km)

Year	Appraisal Forecasts /a							Actual				
	Second	Third		Fourth		Fifth			Sixth		Seventh	
		% of actual		% of actual		% of actual			% of actual		% of actual	
<u>Second Plan</u>												
1967	6,128										6,178	
1968	7,163										6,867	
1969	7,958	7,484	102								7,828	
1970	8,515	8,486	110								7,709	
1971	8,961	9,880	126								7,841	
<u>Third Plan</u>												
1972		11,445	158	7,370	102						7,241	
1973				8,147	95						8,591	
1974				8,449	94	9,074	101				9,005	
1975				9,035	97	10,047	108				9,293	
1976				9,511	98	10,873	112				9,728	
<u>Fourth Plan</u>												
1977						11,940	114	10,526	100		10,509	
1978						13,130	120	11,437	105		10,926	
1979						14,120	128	12,356	112		11,081	
1980								13,078	121	11,532	107	10,798
1981								13,956	129	12,026	111	10,815
<u>Fifth Plan</u>												
1982										12,356	113	10,890
1983										12,945		
1984										13,329		
1985										13,817		
1986										14,321		

/a In appraisal reports for the second to the seventh projects.

Table 4.2

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Intercity Passenger Traffic 1967-82
(Million passenger km)

Year	Appraisal Forecasts /a								Actual			
	Second	Third		Fourth		Fifth		Sixth		Seventh		
		% of actual		% of actual		% of actual		% of actual			% of actual	
<u>Second Plan</u>												
1967											9,576	
1968	No annual										10,590	
1969	forecast	11,363	103								11,077	
1970	made	12,256	125								9,818	
1971	13,000	13,260	152								8,750	
<u>Third Plan</u>												
1972		14,418	143	10,043	100						10,062	
1973				10,290	96						10,720	
1974				10,500	100	11,248	106				10,533	
1975				10,901	96	11,818	104				11,386	
1976				11,210	90	12,754	103				12,440	
<u>Fourth Plan</u>												
1977						13,786	95	14,002	96		14,563	
1978						14,680	88	14,672	88		16,588	
1979						15,418	90	15,318	90		17,086	
1980								15,900	92	19,109	111	17,204
1981								16,455	99	21,022	127	16,553
<u>Fifth Plan</u>												
1982										23,221	147	15,838
1983										25,088		
1984										26,830		
1985										28,372		
1986										29,994		

/a In appraisal reports for the second to the seventh projects.

Table 4.3

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

KNR Seoul Urban Passenger Traffic 1974-82
(Million passenger km)

Year	Appraisal forecast /a						Actual
	Fifth		Sixth		Seventh		
	% of actual		% of actual		% of actual		
<u>Third Plan</u>							
1972	-						-
1973	-						-
1974	193	35					-
1975	1,922	125					545
1976	2,509	135					1,540
							1,865
<u>Fourth Plan</u>							
1977	2,762	109	2,560	101			2,536
1978	2,986	86	3,231	93			3,466
1979	3,221	75	3,285	76			4,300
1980			3,365	57	5,881	133	4,436
1981			3,448	69	7,152	143	4,998
<u>Fifth Plan</u>							
1982					8,441	163	5,196
1983					9,646		
1984					10,718		
1985					11,617		
1986					12,284		

/a In appraisal reports for the fifth to the seventh projects.

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Selected Operating Statistics 1973-82

	1977	1978	1979	1980	1981	1982	Index 1977= 100
System							
Total route (km)	3,142	3,153	3,158	3,135	3,121	3,121	99
Total staff ('000)	40.0	40.4	40.2	40.0	40.5	40.4	101
Traffic							
Passengers (million) - intercity	162.2	175.6	183.0	185.0	172.8	161.5	100
- Seoul suburban	139.4	195.4	240.7	245.8	268.4	282.0	202
- total	301.6	371.0	423.7	430.8	441.2	443.5	147
Passenger-km (million) total	17,099	20,054	21,386	21,640	21,551	21,034	123
Average journey (km)	56.7	54.1	50.5	50.2	48.9	47.4	84
Freight net tons (million)	47.6	49.7	50.9	49.0	48.8	47.5	99
Freight net ton-km (million)	10,509	10,926	11,091	10,798	10,815	10,892	104
Average haul (km)	221	220	218	220	222	229	104
Traffic units (million)	27,608	30,980	32,467	33,438	32,366	31,926	116
Traffic Density							
Passenger-km per route-km ('000)	5,442	6,360	6,772	6,903	6,905	6,740	124
Freight net ton-km per route-km ('000)	3,345	3,465	3,509	3,444	3,465	3,489	104
Operations							
Train-km (million) - passenger trains /a	36.9	39.2	41.6	43.3	45.3	47.6	129
- freight trains	21.3	22.2	22.5	22.0	21.9	21.6	101
- total	58.2	61.4	64.1	65.3	67.2	69.2	119
Freight-km (million) - diesel locomotives	45.0	46.0	48.8	49.7	51.1	61.2	136
- electric locomotives	8.3	9.4	9.4	9.3	9.3	9.3	112
- diesel railcars	10.6	10.4	10.7	11.9	12.3	12.9	122
- electric railcars	24.4	36.3	42.1	43.1	55.1	56.8	215
- total	90.3	102.1	111.0	114.0	127.8	140.2	155
Passenger car-km (million)	287	315	340	356	389	408	142
Freight car-km (million) - loaded	245	251	252	262	262	263	107
- empty	185	193	200	173	168	168	91
- total	430	444	452	435	430	431	100
Operating Efficiency							
Traffic units per employee ('000)	690	767	808	810	799	790	114
Passenger-km per passenger train-km	463	512	515	509	476	442	95
Freight net ton-km per freight train-km	493	492	491	490	493	505	102
Passenger-km per passenger car-km	59.6	63.7	62.9	60.8	55.4	51.6	89
Freight net ton-km per loaded freight car-km	42.9	43.5	44.0	41.2	41.3	41.4	97
Passenger-km per available passenger car ('000) /a	9,359	10,584	11,018	12,805	9,773	8,724	93
Freight net ton-km per available freight car ('000)	712	747	727	683	698	708	99
Freight car turnaround time	5.1	4.9	5.0	5.0	4.8	4.8	94
Availability							
Diesel locomotives, main line (%)	86.9	88.2	89.7	89.5	89.4	91.2	105
Electric locomotives (%)	85.2	89.9	90.0	90.0	88.9	90.0	106
Passenger cars (%)	89.4	91.2	91.2	91.0	90.8	92.8	104
Freight cars (%)	91.5	93.1	94.0	93.8	93.4	94.2	103

/a Including railcars.

KOREA
SIXTH RAILWAY PROJECT (LOAN 1542-KO)
PROJECT COMPLETION REPORT
Operational Performance

	1976	1977		1978		1979		1980		1981	
	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual
<u>Availability of Rolling Stock (%)</u>											
Main line locomotives, diesel	86.4	87.0	86.9(100)	87.5	88.2(101)	88.0	89.7(102)	88.5	89.5(101)	89.0	89.4(100)
Main line locomotives, electric	84.6	85.0	85.2(100)	85.5	89.9(105)	86.0	90.0(105)	87.0	90.0(103)	88.0	88.9(101)
Passenger cars	88.7	89.0	89.4(100)	89.5	91.2(102)	90.0	91.1(101)	90.5	91.0(101)	91.0	90.8(100)
Freight cars	89.3	90.0	91.5(102)	91.0	93.1(102)	92.0	94.0(102)	93.0	93.8(101)	93.0	93.4(100)
<u>Locomotive-km per Available Main Line</u>											
<u>Locomotive ('000)</u>											
Diesel	152	173	157(91)	174	158(91)	174	156(90)	175	157(90)	175	156(89)
Electric	118	120	120(100)	122	117(96)	124	117(94)	127	115(91)	130	117(90)
<u>Passenger Car-km per Available</u>											
<u>Passenger Car ('000)</u>											
Special express coaches	187	237	213(90)	256	230(90)	267	239(90)	277	225(81)	285	247(87)
Limited express coaches	196	204	212(104)	215	242(113)	226	244(108)	237	224(95)	248	244(98)
<u>Turnaround Time for Freight Cars (days)</u>											
Box cars	5.7	5.7	5.3(108)	5.5	5.2(106)	5.3	5.5(96)	5.1	6.4(80)	4.9	6.6(74)
Gondolas	4.4	4.3	4.4(98)	4.1	4.2(98)	3.9	4.2(93)	3.8	4.2(80)	3.7	3.8(97)
Flat cars	6.4	6.2	6.3(98)	6.1	8.1(75)	6.0	9.3(65)	5.9	8.7(68)	5.8	9.3(62)
Container cars	3.8	2.5	2.3(109)	2.4	2.4(100)	2.4	3.4(71)	2.4	5.9(41)	2.3	3.4(68)
<u>Average Load per Loaded Car (tons)</u>											
Coal	45.0	45.3	45.8(101)	45.4	46.2(102)	45.5	46.7(103)	45.6	46.8(103)	45.7	47.2(103)
Cement	45.4	45.6	46.0(101)	45.7	46.3(101)	45.9	46.5(101)	46.0	47.1(102)	46.1	47.1(102)
Ore	43.9	44.3	44.1(100)	44.5	44.9(101)	44.7	45.4(102)	44.9	46.2(103)	45.1	46.8(104)
Oil	42.0	42.2	41.4(98)	42.4	41.0(97)	42.6	41.6(98)	42.8	41.9(98)	43.0	42.2(98)
General cargo	42.3	42.5	43.2(102)	42.5	40.3(95)	42.5	42.4(100)	42.5	46.4(109)	42.5	43.6(103)

Numbers in brackets indicate % of forecast (for turnaround time inverted % of forecast).

Table 5.1

KOREA
SIXTH RAILWAY PROJECTS (LOAN 1542-KC)
PROJECT COMPLETION REPORT
Income Statements, 1977-82
(Won billion)

	1977		1978		1979		1980		1981		1982	
	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal/a	Close Estimate
Traffic												
Passengers (pass-km million)	16,362	17,099	17,873	20,054	18,603	21,553	19,263	21,640	19,903	21,551	31,662	21,034
Freight (ton-km million)	10,526	10,509	11,437	10,926	12,356	11,081	13,078	10,798	13,936	10,815	12,356	10,890
Total Traffic-Units Million	26,888	27,608	29,310	30,980	30,959	32,634	32,343	32,438	33,839	32,366	44,018	31,924
Gross Operating Revenue												
In December 31, 1976 Tariffs												
Passengers	66.7	67.6	73.4	78.8	80.0	91.3	87.9	92.8	93.5	95.7	190.7	127.5
Freight	59.5	52.4	65.1	53.3	70.2	55.0	74.3	52.2	79.3	53.9	77.7	90.7
Other	8.9	8.0	7.6	13.5	8.1	13.3	8.6	17.5	9.0	21.7	28.3	13.6
Subtotal	135.1	128.0	146.1	145.6	158.3	159.6	170.8	162.5	181.8	171.5	296.7	231.8
Add: Revenue from tariffs increases												
Passengers												
% and date of implementation	-	-	10%, Apr 1	19%, Jun 1	10%, Jan 1	15%, May 1	10%, Jan 1	20%, Jan 1 20%, Aug 1	10%, Jan 1	13.5%, Jun 1 5%, Dec 1	20%, Jan 1	5%, Jul 1 4.5%, Dec 15
Revenue	-	-	5.3	8.8	15.6	28.2	26.2	72.3	38.0	108.6	144.3	96.6
Freight												
% and date of implementation	-	12%, Jan 1	15%, Apr 1	15%, Jun 1	15%, Jan 1	10%, May 1	15%, Jan 1	20%, Jan 1 25%, Aug 1	10%, Jan 1	22.3%, Jun 1 11.9%, Dec 1	10%, Jan 1	4.7%, Jul 1 6.6%, Dec 15
Revenue	-	6.3	7.4	11.7	22.7	20.6	38.7	45.8	53.4	76.8	63.2	76.2
Subtotal	-	6.3	12.7	20.5	38.3	48.8	64.9	118.1	91.4	185.4	209.5	172.8
Totals												
Passengers	66.7	67.6	78.7	87.6	95.6	119.5	114.1	165.1	131.5	204.3	335.0	224.1
Of which due to MRP /b	-	6.2	3.2	10.7	5.9	12.7	8.8	24.0	11.6	33.2	-	-
Freight	59.5	58.7	72.5	65.0	92.9	75.6	113.0	98.0	132.7	130.7	142.9	166.9
Of which due to MRP /b	-	10.0	-	14.9	-	24.4	-	22.1	-	24.4	-	-
Other	8.9	8.0	7.6	13.5	8.1	13.3	8.6	17.5	9.0	21.9	28.3	13.6
Total Gross Operating Revenue	135.1	134.3	158.8	166.1	196.6	208.4	235.7	280.6	273.2	356.9	506.2	404.6
Operating Expenses												
Labor	60.7	64.9	72.3	79.0	81.4	103.5	91.5	136.7	102.2	167.6	202.5	191.5
Fuel	16.2	15.9	18.6	18.0	21.8	26.2	23.0	47.8	24.5	76.1	82.9	82.2
Maintenance	27.4	25.7	34.6	29.9	38.0	34.7	42.0	47.6	46.1	51.6	63.2	55.8
General	13.7	12.8	14.0	15.9	15.0	18.1	16.0	20.9	17.0	23.0	38.4	28.0
Subtotal	118.0	119.3	139.5	142.8	156.2	182.5	172.5	253.0	189.8	318.5	387.0	357.5
Less: Economies due to MRP (b)	-	-	4.6	-	5.4	-	7.8	-	9.1	-	-	-
Total Working Expenses	118.0	119.3	134.9	142.8	150.8	182.5	164.7	253.0	180.7	318.5	327.0	357.5
Depreciation	17.4	17.3	20.9	20.5	23.8	26.2	28.2	28.7	31.1	43.6	34.6	46.2
Total Operating Expenses	135.4	136.3	155.8	163.3	174.6	208.6	192.9	281.7	213.8	362.1	421.6	403.7
Net Operating Revenue (Loss)	(0.3)	(2.3)	3.0	2.8	22.0	(0.2)	42.8	(1.1)	59.4	(5.2)	84.6	0.9
Interest charges	20.3	16.3	22.0	23.8	28.5	29.7	33.5	48.6	37.7	60.1	64.6	80.6
Net Nonoperating Revenue	0.5	(1.4)	1.0	(1.3)	1.3	5.0	1.5	4.2	1.8	2.4	(2.2)	5.0
Net Revenue (Deficit)	(20.1)	(20.0)	(18.0)	(22.3)	(5.2)	(24.9)	10.8	(45.5)	23.5	(62.9)	17.6	(74.7)
Subsidy from Government	21.7	21.7	14.6	21.4	12.0	31.9	7.5	5.0	-	-	-	34.8
Net Income (Loss)	1.6	1.7	(3.4)	(0.9)	6.8	7.0	18.3	(40.5)	23.5	(62.9)	17.6	(39.9)
Ratios												
Working	87	89	83	86	76.5	89	70	90	66	89	76	88
Operating (%)	100	101	98	98	89	100	82	100	78	101	83	100
Interest charge coverage	0.5	(0.1)	0.1	0.1	0.8	-	1.3	(0.2)	1.6	(0.1)	1.3	0.1
Return on average net fixed assets (%) in use	-	-	0.3	0.3	2.1	-	3.5	-	4.2	-	5.5	-

/a Seventh Railway Project.

/b Management Rationalization Plan.

KOREA
SIXTH RAILWAY PROJECTS (LOAN 1542-KO)
PROJECT COMPLETION REPORT
Cash Flow Statements, 1977-82
(Current Won billion)

	1976	1977		1978		1979		1980		1981		1982		Totals 1977-82	
	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal/a	Actual	Appraisal	Actual
SOURCES OF FUNDS															
Cash Generated by KNR															
Net operating revenue	(10.0)	(0.3)	(2.3)	3.0	2.8	22.0	(0.2)	42.8	(1.1)	59.4	(5.2)	84.6	(0.9)	211.5	(5.1)
Depreciation	15.0	17.4	17.3	20.9	20.5	23.8	26.2	28.2	28.7	33.1	43.2	34.6	46.2	158.0	182.1
Net nonoperating revenue (expenses)	6.4	0.5	(1.4)	1.0	(1.3)	1.3	5.0	1.5	-	1.8	2.3	-	5.0	7.7	9.6
Total Cash Generated	11.4	17.6	13.6	24.9	22.0	47.1	31.0	72.5	27.6	94.3	40.3	119.2	52.1	377.2	186.6
Sales of Assets	-	0.7	-	0.8	-	0.9	-	0.9	-	1.0	-	10.0	2.0	14.3	2.0
Increase in severance pay provision	1.4	-	(0.1)	-	-	-	2.4	-	3.2	-	3.2	1.6	3.0	-	11.7
Funds provided by Government															
Operating subsidy	13.7	21.7	21.7	14.6	21.4	12.0	31.8	7.5	5.0	-	-	-	34.8	55.8	114.7
Investments	0.9	-	0.8	3.0	0.6	4.5	37.8	9.7	22.2	3.1	22.9	48.8	18.0	69.1	102.3
Total Funds Provided by Government	14.6	21.7	22.5	17.6	22.0	16.5	69.6	17.2	27.2	3.1	22.9	48.8	52.8	124.9	217.0
Borrowing															
Bank Loan 1542-KO	-	-	-	2.4	-	49.7	36.6	5.8	17.3	-	8.2	-	0.6	57.9	62.7
Other foreign borrowing	25.9	30.8	25.0	25.8	22.4	11.2	4.6	42.8	6.4	42.8	21.3	67.4	33.4	220.8	113.1
Local borrowing	33.2	33.3	24.0	51.5	35.0	35.0	46.2	33.0	92.8	30.0	92.1	122.5	144.0	305.3	434.7
Total Borrowing	59.1	64.1	49.0	79.7	57.4	95.9	87.4	81.6	116.5	72.8	121.6	189.9	178.0	584.0	609.9
Decrease in Other Assets Ex-Railroad Funds	-	-	3.1	-	6.4	-	0.9	-	10.6	-	10.9	-	-	-	31.9
Total Source of Funds	86.5	104.1	88.1	123.0	107.8	160.4	191.3	172.2	185.1	171.2	198.9	369.5	287.9	1,100.4	1,059.1
APPLICATION OF FUNDS															
Capital Investments															
In foreign exchange	-	45.7	25.0	58.4	22.4	60.9	41.2	66.3	23.7	66.3	29.5	67.4	34.0	359.0	175.8
In local currency	-	30.8	40.4	28.2	41.7	54.9	91.9	48.6	134.6	42.8	106.5	181.0	142.1	392.3	557.2
Total Capital Investments	52.9	76.5	65.4	86.6	64.1	115.8	133.1	114.9	158.3	109.1	136.0	248.4	176.1	751.3	733.0
Debt Service															
Interest	15.1	20.3	16.3	22.0	23.8	28.5	29.7	33.5	48.6	37.7	60.0	64.6	80.6	206.6	259.0
Repayment	14.6	15.9	17.7	14.4	16.6	15.6	18.5	19.4	36.4	22.6	35.4	41.6	40.9	129.5	165.7
Total Debt Service	29.7	36.2	34.0	36.4	40.4	44.1	48.2	52.9	85.0	60.3	95.6	106.2	121.5	336.1	424.7
Increase in other assets	-	-	-	-	-	-	1.5	-	-	-	1.6	-	-	-	3.1
Total Application of Funds	82.6	112.7	99.4	123.0	104.5	159.9	182.8	167.8	243.3	169.4	233.2	354.6	297.6	1,087.4	1,160.8
Annual change in working capital	1.9	(8.6)	(11.3)	-	3.3	0.5	8.5	4.4	(58.2)	1.8	(34.3)	14.9	(9.7)	15.7	(101.7)
Ratio															
Debt service coverage	0.4	0.5	0.5	0.7	0.7	1.1	0.7	1.4	0.5	1.6	0.4	1.3	0.5	1.0	0.4

/a Seventh Railway Project.

KOREA

SIXTH RAILWAY PROJECTS (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Balance Sheets, 1977-82
(Won billion)

	1976	1977		1978		1979		1980		1981		1982	
	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Appraisal/a	Close Estimate
ASSETS													
Current Assets													
Cash	5.4	5.9	6.2	3.1	8.7	3.1	8.9	3.1	10.4	3.1	8.1	21.1	9.2
Account receivable	9.4	8.1	6.7	11.0	9.3	12.8	30.5	17.4	10.7	19.5	14.1	23.8	16.7
Inventories	14.6	15.1	15.1	18.4	22.0	21.0	22.9	23.2	26.5	26.0	28.3	37.5	30.7
Other current assets	-	-	1.2	-	2.9	-	5.8	-	7.1	-	3.5	20.0	3.5
Total Current Assets	29.4	29.1	29.2	32.5	42.9	36.9	68.1	43.7	54.7	48.6	54.0	122.4	60.1
Less Current Liabilities													
Accounts payable	4.5	9.4	12.4	11.4	11.4	13.0	21.5	13.9	34.5	15.0	47.4	30.7	50.2
Current maturities	4.6	4.8	15.5	5.2	19.5	6.5	21.0	7.5	32.1	9.0	38.4	41.6	38.9
Other current liabilities	6.2	6.0	5.0	7.0	8.8	8.0	13.9	8.5	34.6	9.0	49.1	20.8	61.6
Total Current Liabilities	15.3	20.2	32.9	23.6	39.7	27.5	56.4	29.9	101.2	33.0	134.1	93.1	150.7
Net Working Capital	14.1	8.9	(3.7)	8.9	3.2	9.4	11.7	13.8	(46.5)	15.6	(80.9)	29.3	(90.6)
Fixed Assets													
In use Land	223.2	225.9	225.3	265.4	234.3	292.8	428.4	317.3	423.7	341.3	479.0	395.0	531.4
Other	736.9	799.6	812.3	920.0	873.5	1,091.6	1,022.6	1,274.3	1,212.5	1,467.9	1,700.8	1,566.6	1,935.0
Subtotal gross value of Fixed Assets	960.1	1,025.5	1,037.6	1,185.4	1,107.8	1,384.4	1,451.0	1,591.6	1,636.2	1,809.2	2,187.6	1,961.6	2,466.4
Less Accumulated Depreciation	193.3	216.2	209.0	235.4	229.5	256.9	256.6	282.8	305.1	313.7	439.6	317.7	493.1
Subtotal Net Fixed Assets in use	766.8	809.3	828.6	950.0	878.3	1,127.5	1,194.4	1,308.8	1,331.1	1,495.5	1,748.0	1,643.9	1,973.3
Work in progress	24.1	32.7	18.0	32.7	38.4	32.7	75.8	32.7	134.8	32.7	113.1	28.8	132.1
Total Net Fixed Assets	790.9	842.0	846.6	982.7	916.7	1,160.2	1,270.2	1,341.5	1,465.9	1,528.2	1,861.1	1,672.7	2,105.4
Other Assets													
Deferred assets	-	-	33.0	-	51.2	-	40.1	-	130.6	-	60.3	51.2	60.3
Miscellaneous other	0.1	7.4	3.2	7.4	3.3	7.4	3.4	7.4	5.6	7.4	9.8	4.2	9.8
Total Other Assets	0.1	7.4	36.2	7.4	54.5	7.4	43.5	7.4	136.2	7.4	70.1	55.4	70.1
GRAND TOTAL ASSETS	805.1	858.3	879.1	999.0	974.4	1,177.0	1,325.4	1,362.7	1,555.6	1,551.2	1,850.3	1,547.4	2,084.9
LIABILITIES													
Long-Term Debt													
Loan capital	245.1	275.0	286.1	340.3	351.4	420.6	416.7	482.8	590.8	533.0	690.6	843.0	827.7
Provision for severance pay	3.3	3.3	3.2	3.3	6.2	3.3	8.4	3.3	11.3	3.3	13.7	8.0	16.7
Total Long-Term Debt	248.4	278.3	289.3	343.6	357.6	423.9	425.1	486.1	602.1	536.3	704.3	851.0	844.4
Equity Equivalent													
Capital	71.1	64.9	61.5	82.5	61.5	99.0	61.5	116.2	61.5	119.3	61.5	61.5	61.5
Revaluation of assets	521.0	504.3	511.2	586.3	539.8	681.1	763.2	784.9	847.8	904.3	1,076.9	675.1	1,164.4
Accumulated surplus (loss)	(35.4)	10.8	(6.4)	13.4	(51.2)	(27.0)	(116.6)	(24.5)	(162.1)	(8.7)	(182.4)	(104.3)	(228.2)
Government contributions	-	-	45.9	-	66.7	-	192.2	-	206.3	-	190.0	274.1	242.8
Total Equity Equivalent	556.7	580.0	589.8	655.4	616.8	753.1	900.3	876.6	953.5	1,014.9	1,146.0	906.4	1,240.5
GRAND TOTAL LIABILITIES	805.1	858.3	879.1	999.0	974.4	1,177.0	1,325.4	1,362.7	1,555.6	1,551.2	1,850.3	1,757.4	2,084.9
Ratios													
Current	1.7	1.4	0.9	1.4	1.1	1.3	1.2	1.5	0.5	1.5	0.4	1.3	0.4
Liquid	1.1	0.7	0.4	0.8	0.5	0.8	0.8	0.8	0.3	0.8	0.2	0.7	0.2
Debt to equity	29/71	32/68	35/67	35/65	37/63	36/64	32/68	36/64	39/61	37/65	38/62	48/52	41/59

/a Seventh Railway Project.

KOREA

SIXTH RAILWAY PROJECTS (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Unit Traffic Revenue and Cost - 1977

	Traffic (PK/TK million)	Revenue	Total Operating Cost Variable Fixed (won million)			Net oper. revenue	Revenue	Unit Operating Cost Variable Fixed (won)			Unit net. Operating oper.Rev. ratio (%)
Passenger											
Saemaul Express	550	5,554	2,612	2,288	324	2,942	10.10	4.75	4.16	0.59	5.35 47.03
Ltd. Exp. (Air cond.)	122	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00 0.00
Ltd. Express	6,291	32,821	18,448	11,662	6,782	14,373	5.22	2.93	1.85	1.08	2.28 56.21
Ord. Express	1,357	5,433	5,169	2,774	2,395	264	4.00	3.88	2.04	1.76	0.19 95.14
Ordinary	5,463	13,922	28,476	15,280	13,196	-14,554	2.55	5.21	2.80	2.42	-2.66 205.54
Seoul Urban	2,536	9,843	7,337	3,722	3,615	2,506	3.88	2.89	1.47	1.43	0.99 74.54
Military	401	1,549	1,143	965	178	406	3.86	2.85	2.41	0.44	1.01 73.79
Commuter	380	606	2,943	1,309	1,634	-2,337	1.59	7.74	3.44	4.30	-6.15 485.64
Subtotal	17,100	69,728	66,128	38,000	28,128	3,600					
Freight											
Coal	3,933	20,664	23,668	17,373	6,295	-3,004	5.25	6.02	4.42	1.60	-0.76 114.54
Cement	1,781	11,702	11,038	8,116	2,922	664	6.57	6.20	4.56	1.64	0.37 94.33
ores	785	4,329	4,779	3,432	1,347	-450	5.51	6.09	4.37	1.72	-0.57 110.40
Oil	732	4,590	4,743	3,233	1,510	-153	6.27	6.48	4.42	2.06	-0.21 103.33
Fertilizer	561	3,261	4,077	2,445	1,632	-816	5.81	7.27	4.36	2.91	-1.45 125.02
Grain	289	1,725	2,274	1,268	1,006	-549	5.97	7.87	4.39	3.48	-1.90 131.83
Container	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00 0.00
Miscellaneous	1,830	12,471	12,481	7,997	4,484	-10	6.81	6.82	4.37	2.45	-0.01 100.08
Military	383	1,888	3,003	1,670	1,333	-1,115	4.93	7.84	4.36	3.48	-2.91 159.06
KNR	215	1,801	1,767	1,017	750	34	8.38	8.22	4.73	3.49	0.16 98.11
Subtotal	10,509	62,431	67,830	46,551	21,279	-5,399					
Total	27,609	132,159	133,958	84,551	49,407	-1,799					

KOREA

SIXTH RAILWAY PROJECTS (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Unit Traffic Revenue and Cost - 1978

	Traffic (PK/TK million)	Total Operating				Net oper. revenue	Unit Operating				Unit net. Operating	
		Revenue	Cost	Variable	Fixed		Revenue	Cost	Variable	Fixed	oper.Rev.	ratio
		(won million)					(won)					(%)
<u>Passenger</u>												
Saemaul Express	645	7,850	3,024	2,633	391	4,826	12.17	4.69	4.08	0.61	7.35	38.52
Ltd. Exp. (Air cond.)	461	3,871	1,694	1,107	587	2,177	8.40	3.67	2.40	1.27	4.00	43.76
Ltd. Express	1,852	43,629	20,439	14,110	6,329	23,190	5.56	2.60	1.80	0.81	2.28	46.85
Ord. Express	1,287	4,908	4,970	2,680	2,290	-62	3.81	3.86	2.08	1.78	-0.19	101.26
Ordinary	5,425	14,707	32,967	17,766	15,201	-18,260	2.71	6.08	3.27	2.80	-3.66	224.16
Seoul Urban	3,466	14,702	11,747	5,988	5,759	2,955	4.24	3.39	1.73	1.66	0.99	79.90
Military	516	1,816	1,501	1,437	64	315	3.52	2.91	2.78	0.12	0.01	82.65
Commuter	402	751	3,587	1,467	2,120	-2,836	1.87	8.92	3.65	5.27	-7.15	477.63
Subtotal	<u>20,054</u>	<u>92,234</u>	<u>79,929</u>	<u>47,188</u>	<u>32,741</u>	<u>12,305</u>						
<u>Freight</u>												
Coal	3,963	23,553	27,726	20,140	7,586	-4,173	5.94	7.00	5.08	1.91	-1.05	117.72
Cement	1,846	13,275	12,984	9,651	3,333	291	7.19	7.03	5.23	1.81	0.16	97.81
Ores	741	4,384	5,230	3,736	1,494	-846	5.92	7.08	5.04	2.02	-1.14	119.30
Oil	868	5,951	6,390	4,399	1,991	-439	6.86	7.36	5.07	2.29	-0.51	107.38
Fertilizer	595	3,841	4,713	2,980	1,733	-872	6.46	7.92	5.01	2.91	-1.47	122.70
Grain	338	2,274	2,636	1,687	949	-362	6.73	7.80	4.99	2.81	-1.07	115.92
Container	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Miscellaneous	1,970	13,601	14,154	9,856	4,298	-553	6.90	7.18	5.00	2.18	-0.28	104.07
Military	376	1,955	2,967	1,887	1,080	-1,022	5.17	7.89	5.02	2.87	-2.72	152.54
KNR	228	2,307	2,029	1,225	804	8	8.93	8.90	5.37	3.53	0.04	99.61
Subtotal	<u>10,926</u>	<u>70,861</u>	<u>78,829</u>	<u>55,561</u>	<u>23,268</u>	<u>-7,968</u>						
<u>Total</u>	<u>30,980</u>	<u>163,095</u>	<u>158,758</u>	<u>102,749</u>	<u>56,009</u>	<u>4,337</u>						

KOREA

SIXTH RAILWAY PROJECTS (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Unit Traffic Revenue and Cost - 1979

	Traffic (PK/TK million)	Revenue	Total Operating Cost	Variable	Fixed	Net oper. revenue	Revenue	Unit Operating Cost	Variable	Fixed	Unit net. oper.Rev.	Operating ratio (%)
				(won million)					(won)			
<u>Passenger</u>												
Saemaul Express	772	12,240	4,552	4,001	551	7,688	15.85	5.90	5.18	0.71	9.96	37.19
Ltd. Exp. (Air cond.)	530	5,986	2,417	1,927	490	3,569	11.29	4.56	3.64	0.92	6.73	40.38
Ltd. Express	8,252	56,492	26,922	17,740	9,182	29,571	6.85	3.26	2.15	1.11	3.58	47.66
Ord. Express	1,207	5,856	6,989	3,214	3,775	-1,133	4.85	5.79	2.66	3.13	-0.94	119.35
Ordinary	5,492	17,991	43,381	22,145	21,236	-25,390	3.28	7.90	4.03	3.87	-4.62	241.13
Seoul Urban	4,300	21,310	14,071	6,362	7,709	7,239	4.96	3.27	1.48	1.79	1.68	66.03
Military	399	2,204	1,463	1,377	86	741	5.52	3.67	3.45	0.22	1.86	66.38
Commuter	434	928	5,114	2,048	3,066	-4,186	12.14	11.78	4.72	7.06	-9.65	551.08
Subtotal	<u>21,386</u>	<u>123,008</u>	<u>104,909</u>	<u>58,814</u>	<u>46,095</u>	<u>18,099</u>						
<u>Freight</u>												
Coal	3,892	25,383	33,700	20,30	13,380	-8,317	6.63	8.80	5.31	3.49	-2.17	132.77
Cement	2,085	17,053	18,026	11,210	6,816	-973	8.18	8.65	5.38	3.27	-0.47	105.71
Ores	817	6,008	6,391	4,292	2,099	-383	7.35	7.82	5.25	2.57	-0.47	106.37
Oil	931	8,317	8,607	4,929	3,678	-290	8.93	9.24	5.29	3.95	-0.31	103.49
Fertilizer	525	3,799	5,400	2,744	2,656	-1,601	7.24	10.29	5.23	5.06	-3.05	142.14
Grain	351	2,539	3,402	1,809	1,594	-864	7.23	9.70	5.15	4.54	-2.46	134.03
Container	254	2,080	1,327	764	563	753	8.19	5.22	5.01	2.22	2.96	63.80
Miscellaneous	1,622	11,424	15,280	8,502	6,778	-3,856	7.04	9.42	5.24	4.18	-2.38	133.75
Military	411	2,463	4,211	2,140	2,071	-1,748	15.99	10.25	5.21	5.04	-4.25	170.97
KNR	256	2,695	2,870	1,446	1,424	-175	10.53	11.21	5.65	5.56	-0.68	106.49
Subtotal	<u>11,081</u>	<u>81,761</u>	<u>99,215</u>	<u>58,156</u>	<u>41,059</u>	<u>-17,454</u>						
<u>Total</u>	<u>32,467</u>	<u>204,769</u>	<u>258,758</u>	<u>116,970</u>	<u>87,154</u>	<u>645</u>						

KOREA

SIXTH RAILWAY PROJECTS (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Unit Traffic Revenue and Cost - 1980

	Traffic (PK/TK million)	Revenue	Total Operating Cost	Variable	Fixed	Net oper. revenue	Revenue	Unit Operating Cost	Variable	Fixed	Unit net. oper.Rev.	Operating ratio (%)
		-----	(won million)	-----	-----	-----	-----	(won)	-----	-----	-----	
Passenger												
Saemaul Express	797	18,092	8,208	6,337	1,871	9,884	22.70	10.30	7.95	2.35	12.40	45.37
Ltd. Exp. (Air cond.)	727	10,938	5,322	3,805	1,517	5,616	15.05	7.32	5.23	2.09	7.72	48.66
Ltd. Express	7,739	72,774	36,569	25,635	10,934	36,205	9.40	4.73	3.31	1.41	4.68	50.25
Ord. Express	1,230	7,803	10,915	4,464	6,451	-3,112	6.34	8.87	3.63	5.24	-2.53	139.88
Ordinary	5,883	25,699	59,411	30,478	28,933	-33,712	4.37	10.10	5.18	4.92	-5.73	231.18
Seoul Urban	4,436	26,829	17,275	6,599	10,676	9,554	6.05	3.89	1.49	2.41	2.15	64.39
Military	400	3,370	2,039	1,774	265	1,331	8.43	5.10	4.44	0.66	3.33	60.50
Commuter	428	3,914	10,053	4,484	5,569	-6,139	9.14	23.49	10.48	13.01	-14.34	256.85
Baggage	434	8,247	11,746	3,042	8,704	-3,499	19.00	27.06	7.01	20.06	-8.06	142.43
Subtotal	22,074	177,666	161,538	86,618	74,920	16,128						
Freight												
Coal	3,943	33,953	45,620	28,923	16,697	-11,667	8.61	11.57	7.34	4.23	-2.96	134.36
Cement	2,018	22,475	23,281	14,830	8,451	-806	11.14	11.54	7.35	4.19	-0.49	103.59
Ores	798	7,893	8,717	5,788	2,929	-824	9.89	10.92	7.25	3.67	-1.03	110.44
Oil	461	11,072	10,076	6,106	3,970	996	13.29	12.10	7.33	4.77	1.20	91.00
Fertilizer	833	4,548	5,913	3,311	2,602	-1,365	9.87	12.83	7.18	5.64	-2.96	130.01
Grain	310	3,050	3,756	2,201	1,555	-706	9.84	12.12	7.10	5.02	-2.28	123.15
Container	179	1,948	1,178	743	435	770	10.88	6.58	4.15	2.43	4.30	60.47
Miscellaneous	1,601	14,710	19,041	11,596	7,445	-4,331	9.19	11.89	7.24	4.65	-2.71	129.44
Military	406	3,291	5,212	2,914	2,298	-1,921	8.11	12.84	7.18	5.66	-4.73	158.37
KNR	177	3,674	3,672	1,975	1,697	2	20.76	20.75	11.16	9.59	-0.01	99.95
Subtotal	10,726	106,614	126,466	78,387	48,079	-19,852						
Total	32,800	284,280	288,004	165,005	122,999	-3,724						

KOREA
SIXTH RAILWAY PROJECTS (LOAN 1542-KO)
PROJECT COMPLETION REPORT
Unit Traffic Revenue and Cost - 1981

	Traffic (PK/TK million)	Revenue	Total Operating Cost		Variable	Fixed	Net oper. revenue	Revenue	Unit Operating Cost		Variable	Fixed	Unit nat. oper. Rev.	Operating ratio (%)
					(won million)						(won)			
Passenger														
Saemaul Express	722	21,152	11,715	8,321	3,394	9,437	29.30	16.23	11.52	4.70	13.07	55.38		
Ltd. Exp. (Air cond.)	2,040	32,923	17,172	12,099	5,073	15,751	16.14	8.42	5.93	2.49	7.72	52.16		
Ltd. Express	6,790	75,362	47,715	32,516	15,199	27,647	11.09	7.02	4.79	2.24	4.07	63.31		
Ord. Express	616	4,669	9,487	3,069	6,418	-4,818	6.58	15.40	4.98	10.42	-7.82	203.19		
Ordinary	5,569	32,029	79,919	34,160	45,759	-47,890	4.75	14.35	6.13	8.22	-8.60	249.52		
Seoul Urban	4,998	34,688	24,396	10,818	13,578	10,292	6.94	4.88	2.16	2.72	2.06	70.33		
Military	370	4,315	3,046	2,065	981	1,269	11.66	8.23	5.58	2.65	3.43	70.59		
Commuter	436	4,567	14,089	5,900	8,189	-9,522	10.47	32.31	13.53	18.78	-21.84	308.50		
Subtotal	21,544	209,705	207,539	108,948	98,591	2,166								
Freight														
Coal	4,413	56,916	60,362	40,267	20,095	-3,446	12.90	13.68	9.12	4.55	-0.78	106.05		
Cement	1,783	24,676	24,971	16,312	8,659	-295	13.84	14.01	9.15	4.86	-0.17	101.20		
Ores	963	12,090	12,140	8,668	3,472	-50	12.55	12.61	9.00	3.61	-0.05	100.41		
Oil	660	10,976	10,054	6,032	4,022	922	16.63	15.23	9.14	6.09	1.40	91.60		
Fertilizer	488	6,017	7,845	4,378	3,467	-1,823	12.33	16.07	8.97	7.09	-3.74	130.30		
Grain	158	2,001	2,499	1,414	1,085	-498	12.66	15.82	8.95	6.87	-3.15	124.89		
Container	229	3,066	1,960	1,188	722	1,106	13.39	6.56	5.19	3.37	4.83	63.93		
Miscellaneous	1,560	17,504	22,462	13,959	8,503	-4,958	11.22	14.40	8.95	5.45	-3.18	128.32		
Military	374	3,940	6,049	3,331	2,718	-2,109	10.53	16.17	8.91	7.27	-5.64	153.54		
KNR	177	3,341	3,379	1,774	1,635	-38	18.88	19.09	9.85	9.24	-0.21	101.14		
Subtotal	10,805	140,527	151,716	97,293	54,423	-11,189								
Total	32,349	350,232	359,255	206,241	153,014	-9,023								

Table 7.1

KORFA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Grouping of Actual Project Capital Cost for Economic Analysis

	Actual cost (Won million)	% of total
<u>Capacity Increases</u>		
Lines	27,511	
Motive power	25,750	
Rolling stock - passenger	32,115	
Rolling stock - freight	22,775	
Telecommunications and power	879	
Subtotal	<u>109,030</u>	46.0
<u>Way and Structures Renewals</u>	15,772	7.0
<u>Seoul Urban Network</u>	1,079	0.5
<u>Daejeon Passenger Car Workshop</u>	17,497	7.0
<u>Miscellaneous</u>		
Safety-related investments (including rail/road crossings and safety sidings)	3,993	
Line relocation part of larger industrial development projects	9,870	
Workshop improvements	2,934	
Miscellaneous including right-of-way improvements, buildings, housing, etc.	10,088	
Subtotal	<u>26,885</u>	11.0
<u>Total</u>	<u>170,263</u>	
<u>Double-Track Chung Eui Line</u>	67,628	23.0
<u>GRAND TOTAL</u>	<u>237,891</u>	<u>100.0</u>

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Allocation of Actual Project Capital Costs of Capacity Increases
Between Passenger and Freight Services
(Million won)

	Passenger services						Freight services						Total
	1978	1979	1980	1981	1982	1983 and later	1978	1979	1980	1981	1982	1983 and later	
<u>Lines</u>													
Bypass lines	184	497	185	184	810	2,290	184	497	185	184	810	2,291	8,301
New crossing loops	578	1,201	23	-	-	-	577	1,201	23	-	-	-	3,603
Marshalling yards	-	-	-	-	-	-	-	-	-	-	-	-	-
Station yard extensions	-	-	-	-	-	-	70	79	196	-	-	-	345
Freight terminals	-	-	-	-	-	-	-	2,399	1,999	3,631	-	-	8,029
Lengthening of crossing loops	-	411	-	-	-	-	-	411	-	-	-	-	822
Station buildings	1,297	1,242	-	-	-	-	531	339	-	-	-	-	3,409
Signaling	1,019	1,022	-	-	-	-	480	481	-	-	-	-	3,002
Subtotal	<u>3,078</u>	<u>4,373</u>	<u>208</u>	<u>184</u>	<u>810</u>	<u>2,290</u>	<u>1,842</u>	<u>5,407</u>	<u>2,403</u>	<u>3,815</u>	<u>810</u>	<u>2,291</u>	<u>27,511</u>
<u>Motive Power and Rolling Stock</u>													
New locomotives	3,583	-	2,241	-	-	-	3,882	-	2,429	-	-	-	12,135
Remodeled locomotives	-	3,143	2,438	-	-	-	-	3,405	2,642	-	-	-	11,628
Remodeled rail cars and heating cars	684	637	-	-	-	-	-	-	-	-	-	-	1,321
Breakdown cranes	-	-	319	-	-	-	-	-	347	-	-	-	666
Cars (passenger and freight)	462	12,186	19,467	-	-	-	569	12,555	9,651	-	-	-	54,890
Subtotal	<u>4,729</u>	<u>15,966</u>	<u>24,465</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>4,451</u>	<u>15,960</u>	<u>15,069</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>80,640</u>
<u>Telecommunications and Power</u>	89	482	-	-	-	-	48	260	-	-	-	-	879
<u>Total</u>	<u>7,896</u>	<u>20,821</u>	<u>24,673</u>	<u>184</u>	<u>810</u>	<u>2,290</u>	<u>6,341</u>	<u>21,627</u>	<u>17,472</u>	<u>3,815</u>	<u>810</u>	<u>2,291</u>	<u>109,030</u>
Double-track Chung Bug line	-	-	-	-	-	-	6,545	29,697	31,386	-	-	-	67,628
<u>GRAND TOTAL</u>	<u>7,896</u>	<u>20,821</u>	<u>24,673</u>	<u>184</u>	<u>810</u>	<u>2,290</u>	<u>12,886</u>	<u>51,324</u>	<u>48,858</u>	<u>3,815</u>	<u>810</u>	<u>2,291</u>	<u>176,658</u>
Total passengers = 56,674 or 32% Total freight = 119,984 or 68%													

Table 7.3

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Economic Return on Capacity Increase for Freight Services

Year	<u>Capital costs /a</u>		Traffic that would have diverted without capacity increases (million ton-km) /c	<u>Economic cost savings from alternative modes /d</u>	
	<u>Actual</u>	<u>Constant 1976 prices /b</u>		<u>Actual</u>	<u>Constant 1976 prices /b</u>
	--- (Won million) ---			--- (Won million) ---	
1978	12,900	11,060	270	6,615	5,670
1979	51,300	37,070	460	10,764	7,780
1980	48,900	25,430	280	7,868	4,090
1981	3,800	1,610	390	13,182	5,600
1982	800	323	430	17,280	6,980
1983	2,300	876	500	-	7,270
1984-89	-	-	1,000	-	14,500
1990-2003	-	-	1,500	-	21,750

ERR = 18.8%

/a Rounded figures allocated to freight traffic (see Table 11).

/b Deflator indices used are indicated in para. 3.26, except for mid-1983 which is estimated at 262.48.

/c Estimated figures for 1984 till 2003 based on ample capacity made available by the double-tracking of the Chung Bug line.

/d Based on actual savings per ton-km between rail and trucking costs valued at W 24.5, W 23.4, W 28.1 and W 33.8 respectively in 1978, 1979, 1980 and 1981. Savings for 1982 are estimated at W 36 based on 6% inflation (or at W 14.5 in 1976 prices).

KOREA

SIXTH RAILWAY PROJECT (LOAN 1542-KO)

PROJECT COMPLETION REPORT

Economic Return on Capacity Increase for Passenger Services

Year	Capital costs /a		Traffic added by the project		Operating profits /c			
	Actual	Constant 1976 prices /b	Special express	Limited express	Special express	Limited express	Total (actual)	Constant 1976 prices /b
	--- (Won million) ---		(Million pass-km)				(Won million)	
1978	7,890	6,770	95	1,900	711	5,624	6,375	5,470
1979	20,820	15,040	220	2,370	2,189	8,508	10,697	7,730
1980	24,670	12,830	250	2,050	3,100	9,593	12,673	6,590
1981	180	80	170	2,420	2,222	9,869	12,071	5,130
1982	810	330	90	2,780	1,260	11,120	12,380	5,000
1983	2,290	870	200	2,800	-	-	-	5,330
1984-2003	-	-	200	2,800	-	-	-	5,330

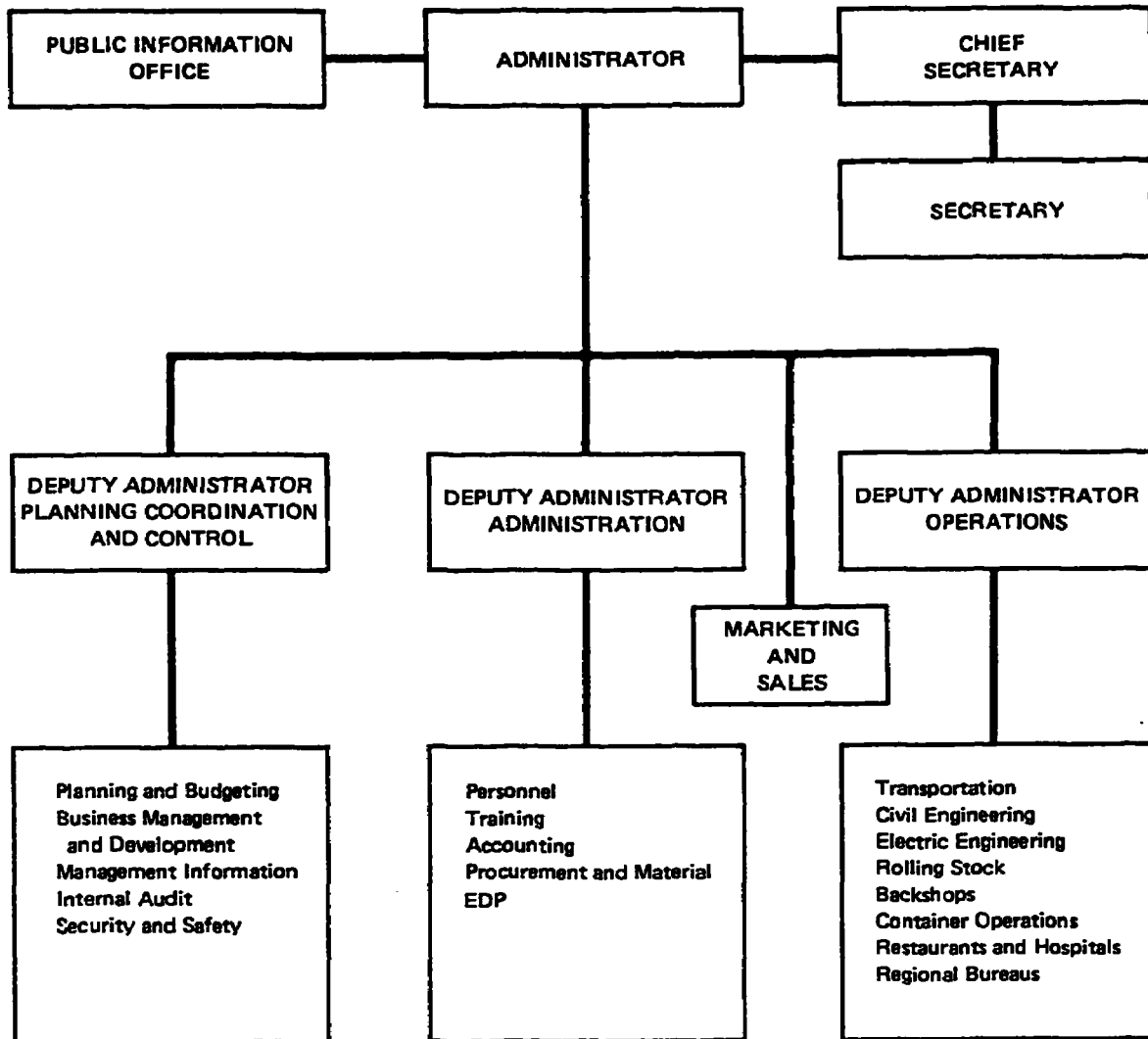
ERR = 28.3%

/a Rounded figures allocated to passenger traffic (see Table 11).

/b Deflator indices used are indicated in para. 3.26, except for mid-1983 which is estimated at 262.48.

/c Differences between operating costs, excluding depreciation and revenues; i.e.: for special express W 7.48, W 9.95, W 12.40, W 13.07 and W 14.0; and for limited express W 2.96, W 3.59, W 4.67, W 4.07 and W 4.0 from 1978 to 1982 respectively.

**KOREA
SEVENTH RAILWAY PROJECT
RECOMMENDED KNR ORGANIZATION**



Source: Consultants and Mission

ATTACHMENT

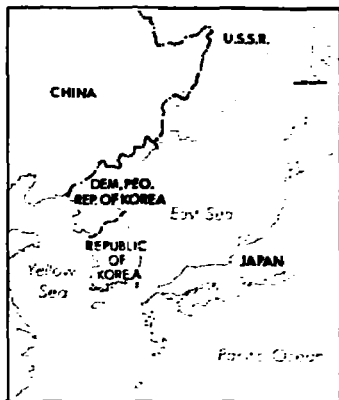
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URWA HL KRSE 047
SEOUL 47/46 23 1936

LT
INTRAFRAD
WASHINGTON D.C.

FOR MR. SHIV S. KAPUR DIRECTOR OF OPERATIONS EVALUATION
DEPARTMENT REFERENCE YOUR LETTER OF MARCH.20TH,1984 REGARDING
PROJECT COMPLETION REPORT ON KORFA SIXTH RAILWAY PROJECT
UNDER 1542-KO PLEASE BE INFORMED THAT WE HAVE NO FURTHER
COMMENCE ON THE SAID REPORT REGARDS KNR SEOUL

COL. LT MARCH.20TH,1984 1542-KO



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DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

East Sea

MAIN LINES

GYEONG BU LINE	Seoul-Busan
JUNG ANG LINE	Changwon - Gyeongsan
GYEONG IN LINE	Yongju - Incheon
JANG HANG LINE	Changwon - Janghang
CHUNG BUK LINE	Juchon - Gangneung
GYEONG BUK LINE	Ulsan - Yeosu
DAE GU LINE	Ulsan - Yangju
GYEONG EUI LINE	Seoul - Munsan
GYEONG HYEON LINE	Yongju - Sinan
GYEONG CHUN LINE	Seoul - Chunchon
HO NAM LINE	Daejeon - Munsan
JEON RA LINE	In - Yeosu
DONG HAE NAM BU	Busan - Pohang
TAE SANG LINE	Juchon - Gangneung
YEONG DONG LINE	Yongju - Gyeongju

UNECONOMIC LINES

SU HUI LINE	Seoul - Sangju
JIN SAN LINE	Gangneung - Samcheong
AN SEONG LINE	Changwon - Anseong
DO GU LINE	Gangneung - Daejeon
HAE SAN LINE	Haeju - Bogen
KIM PO LINE	Yongju - Kimp'o
YONG SAN LINE	Yongju - Dangjin

Yellow Sea

REPUBLIC OF KOREA TRANSPORT SECTOR NATIONAL RAILROAD NETWORK

- DOUBLE TRACK LINES
- SINGLE TRACK LINES
- DOUBLE TRACK UNDER CONSTRUCTION
- ELECTRIFIED LINES
- UNECONOMIC LINES
- MAJOR STATIONS
- INTERNATIONAL BOUNDARIES

KILOMETERS 0 20 40 60 80 100

MILES 0 20 40 60 80

